ELECTRICAL REVIEW

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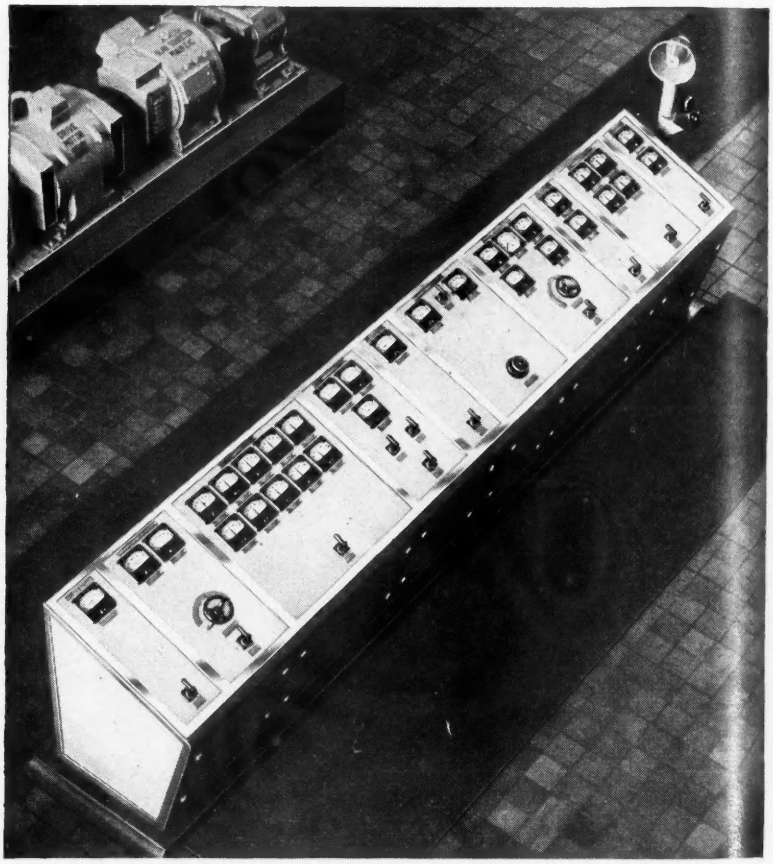

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ELECTRICAL REVIEW

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The Case for Consultants

FREQUENTLY at the end of long articles on important constructional works, civil, mechanical or electrical, one sees the brief acknowledgment: " The consulting engineers were Messrs. XYZ." How far they were consulted is left in doubt: in fact they may have planned the whole project and supervised its course to completion. Anything more than the single line they usually get would be unethical as it might savour of advertising.

As a consequence the consulting engineer remains a nebulous figure to all but the comparatively few who have dealings with him. It is therefore useful to have the consultant's case put by Mr. J. R. Beard in his presidential address to the British Electrical Power Convention at Eastbourne this week. Mr. Beard distinguishes three classes of consultant: first, the individual who can advise on a special technical problem; second, the smaller firm concerned with industrial and commercial electrical installations; and, third, the small number of firms capable of dealing with the largest schemes.

It is mainly with the last class that the President deals for it is they who are most likely to contribute to the expansion of this country's export trade. The case for the employment of these firms is based mainly on two claims: first, that they possess accumulated experience over a wide field and, second, that by engaging them a client can avoid the increasing of his staff, temporarily or permanently, which the planning of a large project would necessitate. One outcome is economy in the use of the very scarce technological talent of this country. Moreover a competent firm of consulting engineers relieves the client of all the worry and trouble involved in such work.

Other things being equal, it is likely that British consulting engineers in charge of an overseas project will favour the placing of orders in Great Britain. But Mr. Beard rightly points out that the consultant's first and last duty is to his client. To ensure acceptance of their tenders British firms must quote for the right equipment at prices and on terms which are better than those of their foreign competitors.

Much attention is being given to raising the standards of under-developed countries by technical assistance and loans. Consulting engineers are very much concerned in such schemes. They are an obvious source of technical assistance and can act as watchdogs on expenditure to see that funds are properly used. The various agencies which are dealing with these developments are mentioned in the address. It is shown that although the American element in these is very strong, it is not so exclusive as is generally thought so that there are opportunities for British engineers and manufacturers.

We think that Mr. Beard has succeeded in his aim to remove the veil from the consultants' activities in a discreet and quite ethical way.

WORLD ELECTRICAL MARKETS

To undertake a survey of the role of electrical equipment in world trade was a task of formidable proportions, but Sir George Nelson has succeeded in his Convention paper in conveying a good idea of the immense scope for the electrical industry. As electricity enters into every modern activity, Sir George can do no more than deal in general terms with each of the many facets with particular reference to " high lights." As well as the immediate possibilities, future prospects are dealt with. Atomic power is not only a new method of producing electricity, it represents a new departure for the British electrical engineering industry in the export field. In this respect Sir George says that a start of some ten years over most other countries and sufficient production capacity to tackle the job, are appreciable advantages for British industry. Some of the equipment which will be needed for the exploitation of atomic energy is now being developed by British firms.

FUTURE DOMESTIC DEVELOPMENT

Economic factors and social changes all point to a rapidly increasing tempo of domestic electrical development. As Dame Caroline Haslett, the director of the Electrical Association for Women, indicates in her Power Convention paper, restrictions on production of apparatus have been lifted, purchase tax has been lowered, and electricity is becoming increasingly available at a cost which is low compared with the general trend of prices. There are fewer domestic servants available and more women running homes and at the same time working outside them. Country life, too, has been transformed by improved transport and communications. The economic facts which have tied electricity to coal are receding in importance and the establishment of atomic power stations should eventually result in a more abundant supply of electricity for everyone. Unfortunately, however, immediate progress in the use of many of the appliances most beneficial to the household is to some extent being held up by the retention of purchase tax and there must be no relaxation of effort to secure its removal.

ELECTRICITY ECONOMICS

Increases in electricity charges invariably receive a great deal of publicity, yet in actual fact the average rise in price since the war has been much smaller than that of other commodities. Standardization of tariffs has, of course, meant that some consumers previously supplied at very low rates have had to pay substantially more, but Mr. D. Bellamy shows in his Convention paper that the average price paid in 1952–53 was only 25 per cent more than in 1937–38. In the same period food prices rose by 91 per cent and clothing by 133 per cent, while " real " personal incomes in 1952 were 136 per cent up. The effect is that electricity is now relatively cheaper than before the war. This has been made possible largely by more efficient generation, greater output and higher load factor. From the domestic consumer's point of view there is thus an incentive to make greater use of electrical appliances which in turn will help to keep down the cost of electricity. The fact that the demand is there, provided that facilities are available to obtain equipment on reasonable terms, was clearly demonstrated in the Yorkshire area when long-term hire-purchase schemes were introduced at the beginning of this year. After only two months cooker sales were doubled and water heater sales increased tenfold.

INSTALLATION PRACTICE

Mr. S. L. M. Barlow's Convention paper is a useful study of international practice in electrical installation work in which Great Britain appears to come out well, at least so far as safety and soundness are concerned. Our main weaknesses seem to be lack of the pre-planning which characterizes most American and Canadian work, and multiplicity of types of equipment which militates against mass production and lower costs. Mr. Barlow commends the British electrician for his high skill but is compelled to regret that his average " output " is now only about 70 per cent of what it was before the war. It is this which makes the electrical contractors hesitant to increase wages, for they can afford to do so only if higher pay is accompanied by greater effort. Reference is made in the paper to " export " possibilities in the electrical contracting industry—a matter in which the author's own company has had considerable experience.

ELECTRIC LIGHTING

In his long and energetic service to the electrical industry, Mr. W. J. Jones, M.Sc., M.I.E.E., director of the Electric Lamp Manufacturers' Association, has contributed many valuable papers on various aspects of his subject to professional organizations, conventions, etc., but probably the paper, " Lighting for Commerce, Industry and the Home," which he presented at the Power Convention, is one of his best. The manner in which he has marshalled his main aspects and treated the supporting facts by word and graph is masterly. It is good for all of us to have driven home such facts that with all things in their true perspective the real basic cost of modern lighting to-day is only about a fourteenth of what it was in 1932 and that the light hours obtained from an 80 W 1953 daylight fluorescent lamp are about seventeen times as much as from a 100 W coiled-coil type filament lamp. The results of the surveys too, e.g., shop window lighting, are presented with a freshness and complete absence of the laboured background of data-producing mechanics. The plea for a fitting wired already for plugging-in in the domestic field and the case made for the conversion of the 600,000 gas street lighting lamps still remaining in Great Britain are two good points.

Next week hair dryers and shavers will be the subject of our domestic appliance survey, which periodically during the past few months has covered most of the apparatus in general use

The Power Convention

AN ACCOUNT OF THE PROCEEDINGS AT EASTBOURNE

EASTBOURNE was the scene of the final convention of the Incorporated Municipal Electrical Association when Mr. J. Eccles, the last president of the I.M.E.A. and now deputy-chairman (operation) of the British Electricity Authority, handed over to Lord Citrine, chairman of the B.E.A., an electric torch symbolizing the change-over to the new nationalized system. It was then, too, that Lord Citrine expressed his Authority's desire that the Convention should continue, though on a broader basis to cover every section of the electrical profession and industry.

The first of the new series, at Torquay in 1949, was considered to be an experiment; that it was successful is warranted by the fact that the gathering now concluding at Eastbourne is the sixth British Electrical Power Convention.

Over 2,000 delegates have been assembled at Eastbourne for a very full programme of events, mainly official, but many of an unofficial character. The weather (which must always be an influential factor in such events) although of a mixed character during the week-end, took a turn for the better on Monday to maintain the tradition of good conference weather.

It is safe to assert that the exhibition organized in connection with the Convention by the British Electrical Development Association is the biggest, brightest and best of the series. Credit for this goes to E.D.A., who organized the exhibition, and to the manufacturers concerned who really went to great trouble and expense to see that their stands attained a high standard of taste and effectiveness.

The display is housed in what is described as a marquee in Devonshire Park. The term "marquee" connotes a draughty, flapping canvas erection involving the maximum discomfort for all concerned. In this case the 24,000 sq. ft. canvas "building" has such an air of permanency that visitors soon forget its temporary character and think themselves to be in a really solid structure. This was not achieved without much hard work on the part of the erectors and standfitters, who were seriously hampered by wind and rain during the earlier stages.

It was the first official duty of the President, Mr. J. R. Beard, C.B.E., M.Sc., M.I.C.E., M.I.E.E., to open the exhibition on Monday evening. The President was introduced by Mr. E. G. Batt, chairman of the Exhibition Committee. Mr. Batt said that the exhibition was the largest yet organized in connection with the Convention and he thanked the Mayor and Corporation of Eastbourne for providing such an excellent site. He stressed that it was particularly designed to attract the public and he hoped that the Mayor would do what he could to persuade his people to visit the display. The manufacturers were grateful to E.D.A. for its great efforts and he particularly mentioned Mr. V. W. Dale (director), Mr. N. Phillips (the E.D.A. exhibition organizer) and Mrs. Snoxell.

Mr. Beard said that the exhibition was the central

The President opening the exhibition. On his right are Sir Vincent and Lady de Ferranti; on his left Lady Hacking, the Mayor and Mayoress, Mr. E. G. Batt, Mrs. Beard, Lord and Lady Citrine and Sir Harry Railing

Mr. Beard delivering his presidential address on Tuesday morning

The President introducing the Mayor of Eastbourne

feature of the Convention and each year there was a greater demand for space. The site this year was on a most convenient position, being so near the conference hall. He, too, thanked the Mayor and Corporation and the Devonshire Park officials for their help. Mr. Beard also expressed appreciation of the work of the Exhibition Committee and regretted that this was probably the last occasion on which Mr. Batt would be chairman of the Committee.

After Sir John Hacking had proposed a vote of thanks to the President, Mr. Batt presented mementos to Mrs. Beard (an electric clock) and the Mayoress (a porcelain coffee percolator). The President then made an extended tour of the stands as did the very numerous gathering of delegates. The latter also welcomed the opportunity of meeting many old friends.

At the exhibition there is a separate "Hall of Cooking" in which, on Wednesday, Thursday and to-day (Friday) various makes of cookers have been demonstrated by Marguerite Patten of the B.B.C. These demonstrations have attracted good public audiences and have undoubtedly helped to spread the electric cooking idea among residents and visitors.

Opening the Convention on Tuesday morning the President introduced the Mayor of Eastbourne (Councillor L. W. Pyle) who extended the customary civic welcome to the delegates. Mr. Beard mentioned that Eastbourne was the first resort to light its promenade electrically. He also said that the Mayor was a farmer on a large scale who made full use of electricity.

The Mayor acknowledged the debt farmers owed to electricity and especially thanked the manufacturers for the equipment which they had made available for the farm and home.

The President read a telegram of greetings to the Queen which it was proposed to send and then presented

At the E.A.W. luncheon (left to right): Miss V. Norvick, the Mayoress, the President, the Dowager Lady Swaythling, the Mayor, Mrs. Beard and Miss N. Balls

Part of the audience at the Winter Garden during the opening session

Sir Harry Railing with the vice-presidential badge. There followed a chain ceremony by which the President and each past-president presented his immediate predecessor with one of the new past-presidents' badges.

Mr. Beard read his presidential address in abbreviated form and afterwards Sir Vincent de Ferranti proposed a vote of thanks, mentioning Mr. Beard's long and valuable services to the electrical industry.

The annual luncheon of the Electrical Association for Women took place at the Grand Hotel under the chairmanship of the Dowager Lady Swaythling (President) who read telegrams from the Torquay Branch and from the Director, Dame Caroline Haslett, who was prevented by illness from attending the Convention. A reply was sent to Dame Caroline expressing the Association's great regret at her absence. Lady Swaythling was proposing the toast of "The County Borough of Eastbourne" to which the Mayor responded.

Mr. H. G. Nelson reading Sir George Nelson's paper

Mr. J. R. Beard proposed the toast "The E.A.W. and Electrical Progress" which, he said, were synonymous. After saying how sorry he was that Dame Caroline was unable to be present, he spoke of the growth of the E.A.W. since its foundation in 1924 until it now had a membership of 10,000. He made appreciative references to the many activities of the Association and concluded by urging the members to press for the universal adoption of the standard fused plug and for the standardization of voltage.

Miss Norah Balls, chairman of the E.A.W., replied, saying that the Association started about five years after women were given the vote and was a feature of the emancipation of women which had started then. Among other things she asked the manufacturers and the Chancellor of the Exchequer to note that women wanted good electrical appliances at prices which they could afford to pay.

The President with Mrs. Beard and Sir Harry and Lady Railing

On Tuesday afternoon the delegates heard Mr. H. G. Nelson, deputy managing director of the English Electric Co., Ltd., present the paper on "Electrical Engineering in World Trade" by Sir George Nelson, F.C.G.I., M.I.Mech.E., M.I.E.E., chairman and managing director of the English Electric Co., who is at present on a trade tour abroad. Several interesting contributions were made by well-known speakers to the discussion which followed. A report of this and the discussions on the four other papers will appear in next week's *Electrical Review*.

Concurrent with this business session, there was a tea party for the ladies at the Pier Ballroom when Mrs. J. R. Beard, the President's wife, acted as hostess. A local firm arranged as an entertainment a display of dress fabrics.

At the Winter Garden on Tuesday evening delegates were received by the Mayor of Eastbourne and the

Mr. S. L. M. Barlow, Mr. J. R. Beard, Mr. V. W. Dale and Mr. W. J. Jones

Mayoress, who were accompanied by the President and Mrs. Beard. This was followed by dancing until 12.30 a.m.

Two papers were presented at the Wednesday morning session: "Modern Lighting for Industry, Commerce and Home" by Mr. W. J. Jones, M.Sc., M.I.E.E., director of the Electric Lamp Manufacturers' Association and "Electricity in the Modern Home" by Dame Caroline Haslett, D.B.E., J.P., Companion I.E.E., director of the Electrical Association for Women.

Mr. Jones's paper was accompanied by some effective demonstrations. Very regrettably, Dame Caroline Haslett was prevented by illness from attending the Convention and her paper was presented for her by Miss P. Thompson.

The rest of Wednesday was free from official engagements but during the day golf competitions were held at the Willingdon Course (gentlemen) and the Royal Eastbourne Course (ladies). All the proceeds from the entrance fees are going to the Electrical Industries Benevolent Association (whose lady flag sellers were in evidence during the Convention). Mr. J. W. Bird (G.E.C.) acted as hon. secretary of the competitions.

1—Messrs. S. F. Steward, C. T. Melling and G. A. Vowles. 2—Mr. E. Long and Sir Henry Self. 3—Messrs. W. J. Hendry, F. A. Rawlings and C. E. H. Verity. 4—Messrs. E. G. Batt, A. E. Mora and A. H. Gambling. 5—Mr. D. Bellamy, Mrs. C. Renton-Taylor, Mr. R. E. Crowe and Mr. C. G. Richards. 6—Mr. and Mrs. Vivian Brain (New South Wales). 7—Mr. and Mrs. J. G. Briggs, Mr. and Mrs. W. T. Trace and Mr. and Mrs. L. C. Penwill.

The paper read and discussed at the Thursday morning session was "The Development of the Domestic Electricity Load at Home and Overseas" by Mr. D. Bellamy, O.B.E., D.L., Companion I.E.E., F.A.C.C.A., chairman of the Yorkshire Electricity Board, and in the afternoon Mr. S. L. M. Barlow, Associate I.E.E., M.Am.I.E.E., immediate past-president of the Electrical Contractors' Association, presented his paper, "Comparison of Electrical Installation Practice at Home and Overseas."

Mr. and Mrs. N. Boydell being greeted at Tuesday evening's reception

Mr. Geoffrey Lloyd, Minister of Fuel and Power, was to be the guest of honour at last night's annual dinner at the Grand Hotel, which was followed by a dance and cabaret. During the evening the "Lady Citrine" and "G. P. Dennis" golf trophies were to be presented to the winners of Wednesday's competitions.

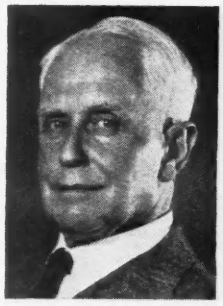
The final session is taking place this (Friday) morning. The "Electrical Forum" is expected to yield some interesting questions and answers by an expert panel. This will be followed by the annual general meeting when Sir Harry Railing, chairman and joint managing director of the General Electric Co., Ltd., will be introduced as the next President.

Presidential Address

By J. R. BEARD, C.B.E., M.Sc., M.I.C.E., M.I.E.E., F.Amer.I.E.E.

POINTING out that the policy of the Convention Council is to maintain a scrupulously fair balance between the wide and differing aspects of electrical power as represented by the various members, Mr. Beard says that of his five predecessors three have been primarily concerned with electricity supply and two with manufacturing. This year they have chosen a consulting engineer as President.

His fellow consulting engineers have welcomed this public recognition of a profession which, by tradition, has so much hidden its light under a bushel. It is desirable that there should be a wider public recognition of the true functions of the consulting engineer and particularly of the contribution he can make to the promotion of electrical development at home and overseas.



Mr. J. R. Beard

Mr. Beard traces the origin of consulting engineers during the nineteenth century—men who undertook the design and supervision of construction of engineering works, being remunerated by fees from their clients for whom they acted in a fiduciary capacity. They kept themselves absolutely independent of any contracting or manufacturing engineers and built up a tradition of professional integrity. The Institutions of Civil and of Electrical Engineers laid down rigid rules for the conduct and practice of their consulting engineer members and in 1913 a special Association of Consulting Engineers (which Mr. Beard represents on the Convention Council) was established. That Association has a code of professional conduct closely following, with certain differences in detail, that laid down by the two Institutions.

In this country it has been the requirement that consulting engineers shall not advertise or solicit professional work, but these restrictions are not observed in many other parts of the world, nor, in many countries, is consulting work entirely divorced from the contracting side.

Economical Use of Technical Staff

Mr. Beard mentions the part played by consulting engineers in the setting up of the Electricity Commissioners and the Central Electricity Board and he expresses appreciation of the decision of the British Electricity Authority to continue to make use of the profession in its large programme of expansion. Similarly this policy has also been adopted by the North of Scotland Hydro-Electric Board and the Northern Ireland generating authorities.

It is pointed out that the employment of consulting engineers relieves the client of temporarily increasing his staff for programmes of capital work. Consulting engineers, with many clients, are able to employ their staffs at a good "load factor." This leads to a more economical use of the country's technical staff and incidentally could have an appreciable effect in helping to deal with the urgent problem of the extreme shortage of technologists.

Modern developments have tended to divide consulting engineers into three categories: first, individuals with specialist knowledge; second, small or medium-sized firms particularly concerned with electrical installations for industrial firms and large buildings; and third, a comparatively few firms with large staffs dealing with the largest schemes and able to employ the highest grade of specialist staff in all branches. Such firms are fully competent to take responsibility for the largest scheme from its initiation to its completion.

Consulting Engineers and Export Trade

In their overseas activities consulting engineers constitute the spearhead of engineering export trade but that does not imply that a British consulting engineer has to place his contracts with British contractors. The consulting engineers' tradition is that they act in the best interests of their clients. Price, technical design and delivery are not the only factors; there are also the questions of spares and repair facilities, the tenderer's previous experience, etc.

In the client's interests designs and specifications should ensure that requirements are adequately defined and, where world tenders are to be invited, there are no unnecessary restrictions which may tend to handicap any responsible tenderers, whatever their country. Many overseas specifications make it difficult for British manufacturers to quote. The chief value of British consulting engineers to British export trade should be to ensure for our manufacturers of plant and equipment a fair and proper consideration of their offers and thus benefit the purchasers by extending the field of competition.

In a reference to American financing of aid to under-developed countries, Mr. Beard says that the United States is more ready than is sometimes realized to associate non-American manufacturers with American-sponsored overseas projects. The raising of the standard of living in under-developed countries is of great importance from several points of view, benefiting both the recipients and those who provide the assistance, although the countries themselves do not always realize this. It is important to ensure that they do not feel that they are being exploited in the interests of the more highly industrialized countries.

Reverting to the restrictions on advertising and the soliciting of work by consulting engineers, Mr. Beard says that while there is no suggestion of any change of attitude for work in Great Britain there is a growing appreciation of the fact that the restrictions hamper them in some overseas countries. The matter is continually being pressed upon the Association of Consulting Engineers by the Board of Trade, but what has been said about the value of the consulting engineers' ethical approach indicates that any further relaxation should be made with caution. That, however, is no reason for shirking or delaying discussion of this important problem.

A most important factor in overseas electrical developments is the encouragement of promising projects through technical assistance and loans. In both aspects consulting engineers are directly concerned. Mr. Beard reviews the methods of financing overseas projects, which have changed

since the war. Before the war Great Britain took a leading part in this but now she has found difficulty in providing the large capital sums necessary even for Commonwealth development, while the United States has been in a position to provide vast amounts. Canada has been similarly placed, on a smaller scale. There seems to be, however, some prospect of increasing participation by Great Britain in future years.

For various reasons the provision of private capital for overseas investment has been almost negligible, especially for public utilities. Consequently finance has had to be provided by the more developed countries, particularly the United States, through various government agencies. Mr. Beard names seven of these and outlines their functions.

Assistance for Under-Developed Areas

The Technical Assistance Board of the United Nations Organization administers funds provided out of the U.N. budget but mainly by voluntary contributions from participating countries in the form of more or less free specialist technical advice and arrangements for the free training of specialists. It does not provide investment capital.

The Foreign Operations Administration incorporates the various agencies set up by the U.S. Government dealing with their foreign economic activities. These include the Mutual Security Agency and the Technical Co-operation Administration set up to give effect to President Truman's "Point IV" scheme to make American technical knowledge available to under-developed areas and to foster capital investment in them.

While technical advice is normally given by American firms exceptions have been made and it is possible that there may be exceptions in the placing of contracts. In dealing with countries in which British engineers have had long experience the F.O.A. may find it helpful to bring in British consulting engineers either as principals or in an assisting capacity to American firms.

The Colombo Plan deals with co-operative economic development in South and South East Asia. The participating Commonwealth Governments have agreed to provide technical assistance up to a value of £8 million. The Plan also covers the training of specialists and the provision of equipment for local training and applied research. In the first three years nearly 200 experts were provided and over 1,000 trainees were received.

Although the Plan was not intended to be a source of capital assistance, the participating Governments have provided substantial grants towards development programmes. Nevertheless each benefiting country has made the major part of the effort involved in its economic development programme.

The International Bank for Reconstruction and Development is run on business lines, only making loans under proper security. Although its headquarters is in Washington it is a truly international organization with 56 countries as members. Up to 31st March last the Bank had made 102 loans in 33 countries totalling over $1,892 million. During 1953 30 per cent of the funds disbursed was in non-dollar currencies and 40 per cent was spent in countries other than the United States. The United Kingdom has agreed to make up to £60 million available over a period of six years for sound development projects in Commonwealth countries likely to benefit the Sterling Area's balance of payments. The pace of loans and disbursements is steadily increasing and a number of additional loan projects are under active consideration.

The Bank is of great interest to British consulting engineers, contractors and manufacturers. It has been found that the organization has a thorough impartiality of outlook. Any deficiency of British experts on the staff has been largely the result of lack of British interest, but this, it seems, is now being overcome.

In dealing with the Bank's procedure Mr. Beard stresses that in the matter of tendering international competition is strongly encouraged but the Bank requires to be satisfied that the successful tenderer is competent to carry out the work efficiently and to time. There is a growing tendency to condition the loans with insistence on the employment of professional advice from firms known to have experience in the class of project involved.

The Export-Import Bank is an independent American Federal agency for the purpose of aiding in financing, and facilitating, exports and imports and the interchange of commodities between the United States and the rest of the world. Up to the end of last year the Bank had authorized credits totalling over $5,200 million, but apart from uranium production in South Africa credits were almost entirely in non-Commonwealth countries. Consequently the field for British engineers has been limited, although it is possible that in certain circumstances British advice and assistance might prove to be useful to the Bank.

The Colonial Development Corporation, financed by advances from the Colonial Office, was formed to encourage beneficial developments in the Colonies of too large or too uncertain a character to attract normal finance. At present about £25 million is being employed on 50 schemes in 20 colonies. About £6 million of this is for public utilities, mainly electric power.

The last agency is the Commonwealth Development Finance Co., Ltd., with a nominal capital of £15 million to provide finance and assistance for the development of Commonwealth resources which it considers sound and promising.

Dealing with the policies of these financial agencies Mr. Beard deprecates the employment of individual experts in public utility schemes. He contends that none of these experts can have the breadth of knowledge and accumulated experience of large firms of consulting engineers accustomed to dealing with major schemes.

Comprehensive Tenders

The President also refers to the "all-in" bid, covering consulting services, manufacture and construction. He considers that the client-consultant-contractor relationship is likely to produce a cheaper and better job. However, the comprehensive offer is attractive to certain overseas clients and at the urgent request of the Board of Trade consideration is being given to arrangements by which British consulting engineers can assist groups of British contractors to put forward comprehensive offers in competition with those obtainable from abroad.

Mr. Beard devotes some attention to the impact of the development of atomic energy upon the future of electrical development. Information now available indicates the probability that in the quite near future not only will it be possible to produce energy from nuclear fuel in natural uranium reactors on a large scale at a price competitive with coal, but that reactors of the enriched and breeder types may be developed to a commercial stage sooner than was expected even a year ago. It therefore seems unlikely that electrical development will be slowed up by limitations of our coal resources. Indeed, we may look forward to its being vastly increased because electricity is the only form in which, at present, it appears possible to apply atomic energy to industrial and domestic use. Mr. Beard concludes his address with the hope that he has succeeded in drawing the attention of those concerned with the study, development and finance of power projects to the consulting engineering profession.

Electrical Engineering in World Trade

By SIR GEORGE NELSON, F.C.G.I., M.I.Mech.E., M.I.E.E.

In the author's absence on an extended overseas tour this paper was read by Mr. H. G. Nelson, M.I.C.E., M.I.Mech.E., M.I.E.E. Introducing his subject, Sir George Nelson refers to the important theme of the Convention—"The Promotion of Electrical Development at Home and Overseas"—and sketches the general economic background; he refers particularly to the need for this country to pay its way by means of exports and to our main resources—coal, the technical skill and ability of our people, and invisible exports.

He shows that the basis of the most efficient production is electricity. This poses the questions whether the present installed generating plant is adequate and whether the planned addition to that plant is sufficient to meet future demands. The conclusion is that in the past insufficient attention has been paid to the improvement of the efficiency and productive capacity of industry and that there has not been a full realization by those responsible for finance of the serious effect of even a small shortage of generating capacity on industry and on the country.

Sir George Nelson, who is chairman and managing director of the English Electric Co., Ltd., is absent abroad and his paper was read by Mr. H. G. Nelson

After referring to the policy of the United States and Canada, Sir George says that Great Britain is not weak or inefficient. Coal has been conserved by close collaboration between the electricity supply industry and plant manufacturers, but two million more tons of coal a year could be saved by the replacement of old plant. Improvement in our world competitive position could be achieved by collaboration between industry and the workers, e.g., by working double and even treble shifts.

The domestic electrical load is important as providing amenities for the home and a base load for our exports of domestic electrical equipment. The British Electricity Authority and the Electricity Boards have a £130 million ten-year programme which will mean connecting up over 100,000 farms—a great opportunity for the electrical engineering industry.

Electrical goods are estimated to constitute 3 per cent of the value of world trade; in 1952 the value of world exports and imports was estimated at £55·185 million. Sir George proceeds to survey the world market for electrical goods. On a conservative basis hydro-electric resources capable of development total between 600,000 and 700,000 MW; at the end of 1952 only about 90,000 MW had been developed. By the end of 1961 the demand for plant will reach 10,500 MW and present manufacturing capacity is ample to meet it. British plant manufacturers owe a debt to the North of Scotland Hydro-Electric Board for enabling them to show some of the most modern water-power plant to overseas visitors.

Surveying the demand for thermal generating plant, Sir George shows that about two-thirds of the electricity output in 1952 was from thermal plants. Sets of over 100 MW are now being produced and 200–250 MW sets are projected. Steps towards international standardization and the need for considering the North American market with its 60 c/s standard as a separate entity from the technical and design point of view are mentioned.

The diesel-engine installation is shown to be a most convenient and economical form for private use and the future of the gas turbine is considered. The latter promises to evolve into a robust and reliable prime mover capable of using the lowest grades of solid, liquid and gaseous fuels, e.g., collieries' waste products. It has scope in many overseas countries, particularly where natural gas is available.

How the adoption of the highest voltages reduces transmission costs is shown and in this connection reference is made to the British 275 kV supergrid, the development of cables operating at up to 300 kV and the building of very large transformers and high breaking capacity switchgear.

Turning to the use of electric power, Sir George refers to the development of large a.c. winders for mines (a 4,500 h.p. twin winder in South Africa is mentioned), the use of electric locomotives for mine haulage and other mining applications.

In the steel industry bigger units and higher speeds have been achieved and much research has been devoted to meeting the electrical control problems raised. In the Abbey Works of the Steel Company of Wales the slabbing mill has twin motors with a combined rating of 10,000 h.p. The author makes reference to a large steelworks being erected in Spain, the rolling mill of which will have a 20,000 h.p. main drive with the prospect of an increase to 50,000 or 60,000 h.p.

To indicate the scope for electrification of the textile industries, Sir George says that at present only about 38 per cent of the drives are by electric motors on the public supply. He mentions a number of electrical devices which have been produced to increase output. Overseas, too, electrical manufacturers are endeavouring to secure a share of the great potential textile-industry business.

Although this country has been a railway pioneer, of the 19,000 locomotives in service only 81 are electric and six diesel-electric. There are great economies in electrification but the British Railways' present programme is modest in view of the possibilities. Conversion would save a great deal of coal, raise efficiency and enable a better service to be given.

The extent to which electricity is used in ships—for both services and propulsion—is dealt with. It is mentioned that the planned electrical installations in 440 ships built in 1953 aggregated 200 MW of generating plant.

Sir George considers the use of electricity in the home as of the first importance and he gives some figures showing the output of domestic appliances in five years and the proportions which were exported. At the turn of last year

the country was approaching record production of electric cookers, washing machines and immersion heaters. This market is considered to be relatively untapped as compared with the United States and Canada. Now there is an upward trend stimulated by the campaigns of the Electrical Development Association and the Electricity Boards which are receiving the warm support of appliance manufacturers.

A more realistic attitude on the part of the Treasury towards purchase tax and credit facilities would benefit the housewife and considerably stimulate export trade. This section concludes with notes on the growth of television and on standardization.

Next the author shows the benefit to the customer and to the contractor of comprehensive projects involving a single contract to be carried out by one firm.

The last section of the paper deals with the impact of raw materials, electronics and atomic energy on electrical engineering. In the first place the author surveys constructional materials (including a reference to the possibilities of titanium), magnetic materials (mentioning cold rolled oriented silicon iron strip), conductor materials (the use of aluminium instead of copper), insulator materials and semiconductors (germanium and silicon).

Examples are quoted of the many uses of electronic control apparatus in a number of industries. Finally the prospects of the commercial production of atomic power are dealt with, the author pointing out that electrical engineers will have to adapt themselves to a new technique. Sir George believes that this country's contribution to the development of this source of power will be both crucial and leading.

Attached to the paper are twenty graphs and ten tables comprising the information upon which the statistical aspects of the paper are based. It is a very useful source of reference.

Lighting for All Purposes

By
W. J. JONES
M.Sc., M.I.E.E.

FOLLOWING a survey of electric lighting developments from the days of Edison and Swan in his paper " Lighting for Commerce, Industry and the Home," Mr. W. J. Jones, director of the Electric Lamp Manufacturers' Association, supports his contention that electric lighting is one of the cheapest services available to-day by simple curves relating the cost of lighting to the cost of living over the past twenty years. These curves show that the real cost of lighting has fallen to a quarter in the case of tungsten lamps and to a fourteenth in the case of fluorescent lamps on the 1932 figures.

Another clever illustration shows by areas the relative life outputs of different types of lamps; our own readings of this illustration are roughly: coiled-coil filament lamp 1; 80 W daylight fluorescent lamps (1939) 4, (1947) 9, (1951) 16, (1953) 17.

In discussing the light emissions the author makes the point that a little bias of the light towards the green would inevitably greatly increase the luminous efficiency, while the introduction of more red would decrease it. This does not mean, however, that the emphasis is on efficiency as is shown in a comparison of the de luxe warm-white lamp and the new warm-white lamp. In mentioning that in B.S. 1853 for fluorescent lamps colour is not specified, he shows, by a table, the percentage luminance for selected wavelengths in the visible spectrum.

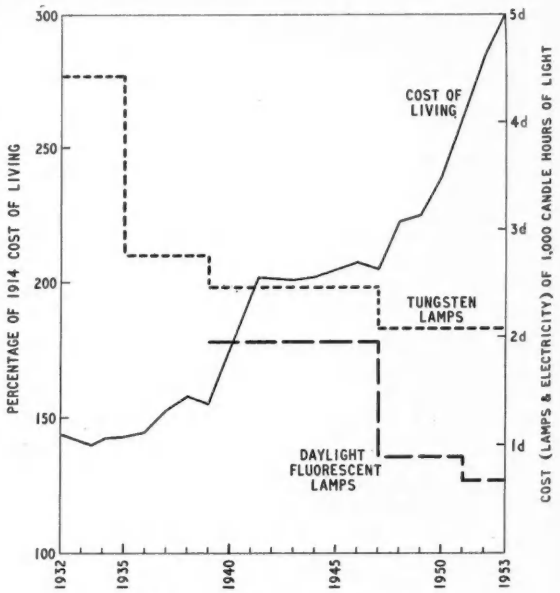
Demonstrating that the choice of phosphors permits a very wide range of values for white lamps, a table is included which gives the colour appearance, colour rendering and efficiency of eleven types of 5ft 80 W fluorescent lamps. As the result of International Electrotechnical Commission discussions so far, there is a possibility of standardizing colour appearance on three " white " lamps; one which blends very well with daylight, one which blends with normal daylight and incandescent light, and one which blends with, and may be used instead of, incandescent light.

In connection with shop lighting the author indicates by table and graph the advance made in consumption since the removal of war-time and post-war restrictions. The consumption for lighting 54 shops in Eastbourne has increased from about 36,500 kWh in 1946 to 80,000 kWh in 1953.

The adoption of higher levels of shop illumination makes for load factor improvement. While the average annual consumption of 280 shops each with an installed load of 1·5 kW or under is 480 kWh and the utilization factor is 10 per cent, in the case of 67 shops with an installed load of over 1·5 kW the average consumption is 5,320 kWh and the utilization factor 18 per cent.

A survey of shop window lighting between 1949 and 1954 shows that the number of shops with " after hours " window lighting has doubled and the extent to which the lighting has been modernized can be judged from the fact that the proportion of shops using fluorescent lighting has increased from 13 per cent to 60 per cent. Finally the promotion of shop lighting demands imagination to inspire the use of light in new ways, for shopkeepers depend on change for their existence.

Two particularly pointed quotations referring to office lighting are made. In " Working Conditions in the Civil



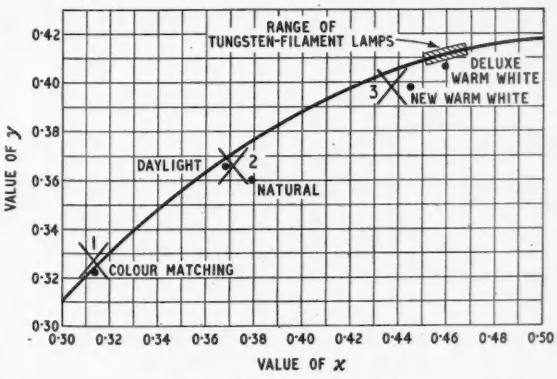
The really low cost of lighting is indicated by the relationship of the cost of lighting to the cost of living

Service" (H.M.S.O. 1947) it is stated:—"We say unhesitatingly that the official standards [of artificial lighting] are much too low. They are below obligatory factory standards." Again, in "The Lighting of Office Buildings"—Post-war Building Studies No. 30:—"For book-keeping, typing, computing machine work, filing, and general office work we recommend values of the order of 20 lumens per square foot . . . for drawing office work . . . we recommend 30 to 50 lumens per square foot . . ."

In dealing with industrial lighting Mr. Jones stresses the effects of improved lighting on production but first calls attention to certain stipulations in factory reports, for instance an early recommendation of 0·25 lumen/sq ft at floor level. Finally in this section the author mentions two recent developments. One is the MBF/U high pressure mercury vapour discharge tube which has been improved by the use of a new fluorescent powder so that the lamp gives a whitish light with quite good colour rendering. The other development is the 1 kW and 2·5 kW high pressure m.v. lamps which are particularly suitable for use in lofty factories.

It is perhaps in the domestic lighting section of the paper that the author makes his most forceful case. In the first place he calls for the facility to the housewife of being able to buy a lighting fitting already wired for plugging into an outlet. The lighting practice aspect of home lighting can be divided into (*a*) lighting for the prevention of accidents, (*b*) utility lighting and (*c*) decorative lighting.

He points to the relative numbers of fatal accidents in the home and road deaths in 1952—5,226 and 4,221 respectively—and declares that many of the home accidents would have been prevented by sufficient lighting points, on staircases in particular. The author recalls the mass experiment which was initiated on the occasion of the first National Electrical Convention at Bournemouth in 1935 when of 20,000 people 80 per cent chose an illumination of 75 lumens/sq ft or more, and he illustrates profusely the variations in the choice of lighting values according to the ages of the choosers.



I.E.C. proposals indicate the possibility of standardizing colour appearance: x and y = chromaticity co-ordinates

On decorative lighting for the home Mr. Jones couples the fact that at no other time has there been available such a variety of decorative material suitable for lighting fittings as at present with a plea for more lighting outlets.

As to public lighting, the author makes a strong case for the conversion of the 600,000 gas street lighting lamps still remaining in Great Britain. Comparative costs of gas and electricity which placed gas lighting at a distinct disadvantage in 1939 are even more favourable to electricity to-day because the cost of gas since 1939 has increased more than the cost of electricity.

Electricity in the Home

By
DAME CAROLINE HASLETT
D.B.E., J.P.

THE factors which favour or impede the development in the use of electricity in the home are analysed in a paper given on Wednesday by Dame Caroline Haslett, director of the Electrical Association for Women. Electricity in the modern home, she says, is inextricably bound up with the lives of the people of Britain and with the life of Britain herself. The well-being of individual families and of the whole national family are inter-related; both depend upon an expanding export market, and this in turn depends upon expansion in electrical production.

In 1953 the electrical industry was second among the leading exporting industries of Great Britain and domestic electrical appliances, fittings, accessories and so on formed the second largest item of all electrical products. We must sell our products abroad in increasing quantity to provide the other commodities required for the way of life twentieth century citizens desire, and to which technical advances have entitled them and, above all, to avoid restrictions on imports of food and raw materials.

The opportunity and the necessity is laid upon the electrical industry to expand its export production, but to do this British manufacturers of domestic equipment must have behind them a stable home market to balance the fluctuations of world trade. If good quality goods are produced for both the home and export markets, then the designer's job is simplified and production costs are cut. World trade is even more important to Britain to-day than it was in the nineteenth century, and now it is not so straightforward. It is no longer the comparatively simple matter of supply meeting or creating demand, for to-day there is keen competition from other countries and political factors add to the complexity of the problem.

Electricity in the home represents something different to different people. To the housewife labour-saving electrical equipment transforms her home and offers physical as well as psychological benefits to herself and her family. The factors affecting electricity in the home can be broadly described as economic and social. The economic and social factors are so interdependent, however, that it is difficult to segregate and group them. But the main economic factors favourably affecting the position are the general lifting of restrictions on production, the increase in new houses, the general levelling down of purchase tax, the increased supplies of electricity and the cheapness of electricity compared with the general trend of prices.

After the low levels of production reached in 1952, it is a stimulus to know that in the last quarter of 1953, while there was a strong revival of all domestic equipment, electric cookers delivered to the home market were about double the average rate throughout 1952 and the production of water heaters during this period reached the highest level ever recorded. Against these favourable factors there are some which operate in the opposite direction. The electric refrigerator is one of the outstanding examples of the

penalizing effects on sales of purchase tax coupled with hire purchase restrictions.

After some fifty years of domestic electrical development we now stand on the threshold of a new era of electrical progress in the home. New ideas in design and production will be needed to meet the competition from foreign manufacturers, but that Britain is in the forefront in domestic electrical progress is recognized by her customers overseas. The development of the domestic market is not a simple matter and does not end with the design and performance of appliances. Inadequate wiring and the lack of a sufficient number of plug points in many homes still constitute a serious hindrance to development.

After reviewing the apparatus now available, Dame Caroline states that while the British public is becoming more articulate on its requirements, the electrical manufacturing industry is indeed showing initiative and imagination in keeping abreast of, and even anticipating, social change. What is true of the needs in the homes of Britain is also true of the homes overseas. Hydro-electric schemes in under-developed countries will help to change the lives of people who have hitherto existed under primitive conditions.

Indicating why people choose electricity in their homes, Dame Caroline gives tabulated details of a number of houses and their occupants, and the cost of electricity they consume. In her concluding remarks on research and future development she declares that the economic facts which tied electricity to coal are receding in importance, and when atomic power stations are fully established the economic arguments which teased the 1940's and 1950's will ultimately be out of date. No longer should it be suggested that the use of electricity must be progressively adjusted to the diminishing output of coal for the nation's use, for although atomic energy to benefit the home may be only on the horizon, it is a goal of optimism towards which we move, not the goal of pessimism so recently presented to us.

Domestic Load Development

By D. BELLAMY, O.B.E., D.L.

IF domestic electricity supply in this country was economic and competitive before the war, what is the position under the changed circumstances of the present day? This question is considered in the first part of Mr. Bellamy's paper, the second being concerned with the trend abroad.

Introducing the main theme, the author cites the case of a privately built housing estate of 500 working-class houses equipped with electric cookers and wash-boilers, and with points for fires and other electrical equipment. The connected demand per house in 1934 was 9 kW and the probable maximum demand 5 kW, or 2,500 kW in the aggregate. Because of the doubts which then existed as to the economics of domestic development (and in which respect the author says that history is now repeating itself), an investigation was carried out which proved that domestic electrification for working-class estates was a practical and economic proposition at the existing tariff of 15 per cent of the rateable value plus ½d per kWh. The chief reason for this was the large diversity of use, giving a fixed cost of 16s per kW for the individual consumer's m.d. against a total simultaneous demand cost to the undertaking of £8 10s.

Mr. D. Bellamy is chairman of the Yorkshire Electricity Board

Since 1934 the total consumption of the estate has risen from 530,000 to 1,220,000 kWh. Spot tests have shown that the peak demand is still in the summer and that additional use and connections have increased the demand, so that to preserve the comparison the after-diversity demand has been increased in proportion to the rise in consumption. To-day's annual costs are therefore shown as £5,082 (250 kW at £9 10s and 1,220,138 kWh at 0·5324d), against an income of £5,508, giving a profit margin of 8·4 per cent. Though the tariff shows a 73·8 per cent increase on the pre-war charges, the average price per kWh (1·08d) is only 15 per cent higher owing to the larger consumption.

The paper proceeds to compare broadly the costs throughout the country on the basis of the Electricity Commissioners' 1937–38 returns and the 1952–53 report of the British Electricity Authority. From a table in an appendix it is seen that the increase of 217·2 per cent in running costs has been brought down to an average overall increase of 20 per cent as a result of the greater output and the improvement in load factor from 31·8 to 42·6 per cent. It is pointed out that the effect of the higher load factor on the national supply is to reduce the overall cost from 1·540d to 1·309d per kWh, a saving of 0·321d, or £50 million on a total supply of 51,500 million kWh.

Dealing further with load factor improvement (by wider diversity of demand and extended hours of use) the paper summarizes the result of a survey of groups of different types of residential consumers carried out last year. It is shown that in only two cases out of ten did the peaks coincide and these were both off the Area peak. The second highest load factor was on the highest cooker saturation, the highest load factor being on the second largest water heater saturation.

A table analysing the cost of supplying three estates affords clear proof of the necessity for the extension of domestic development and increased use of the supply. The prices used are the new domestic tariff which, based on ascertained costs, is considered to be profitable with reasonable consumer use. On the consumer-related cost basis, the amount of £1 15s includes the whole of the charges on capital expenditure in respect of consumers' services.

Under the heading of "Market Conditions" the paper draws attention to the fact that of the total of about 13 million houses in the country only slightly over 17 per cent have electric cookers installed. A short summary of electrical and gas appliances manufactured indicates that in relation to cookers some of the ground lost since 1948 has been regained, and it is expected that the future will bring a continuation of this trend both as regards cookers and other appliances. During the last 30 years domestic sales have increased from 8 to 31 per cent of the total sales of electricity in this country.

Quite clearly electricity price increases are well below the level of increases both in other commodities and incomes and particularly in comparison with "real" personal incomes and wholesale prices. This means that electricity has a much greater economic advantage than before the war. Mr. Bellamy emphasizes that the further extended use of electricity is not only advantageous to the consumer, but to the country's productivity and economics as a whole. An intensive educational campaign is called for, he says.

Can we hold our present competitive levels? Because of the higher costs of plant it may be that in the general standardization of prices alternative forms of energy may be more economic but in the domestic sphere these will be few. Offsetting the higher costs are such factors as increased output, larger units of generating plant and improved efficiency, proportionate reduction in administrative costs, and the application of incentive tariffs to extend diversity of demand and increase load factor.

of Supplying and Revenue Received from Three Housing Estates	Estate A	Estate F	Estate K
Annual consumption per consumer	600 kWh	1270 kWh	3000 kWh
Contribution to Area m.d. per consumer	0·29 kW	0·38 kW	0·79 kW
ON BASIS OF AVERAGE DEMAND AND UNIT COSTS:			
Revenue received per consumer—	£	£	£
Unit charge at 4½d	3·44	3·44	5·36
Unit charge at ⅞d	1·46	3·90	9·80
Total	4·90	7·34	15·16
Cost of supply per consumer—			
Demand-related cost	2·76	3·61	7·51
Unit-related cost	1·33	2·82	6·66
Total	4·09	6·43	14·17
Surplus	+0·81	+0·91	+0·99
ON BASIS OF ALLOWING A CONSUMER-RELATED COST OF £1 15s PER CONSUMER:			
Revenue received per consumer—	£	£	£
Unit charge at 4½d	3·44	3·44	5·36
Unit charge at ⅞d	1·46	3·90	9·80
Total	4·90	7·34	15·16
Cost of supply per consumer—			
Consumer-related cost	1·75	1·75	1·75
Demand-related cost	2·21	2·90	6·03
Unit-related cost	1·33	2·82	6·66
Total	5·29	7·47	14·44
Surplus or Deficit	−0·39	−0·13	+0·72

After referring to the findings of the Egerton and Ridley Committees and the recommendations of the Ministry of Health "Housing Manual 1949" with regard to adequate installations, the paper deals with the economies which have resulted from modifications in distribution systems. There is a brief review of promotional activities, consumer relations, publicity and allied subjects. Appendices include one illustrating the total and domestic load curves for average working days in each month and another shows typical domestic load curves for the Yorkshire area.

Summing up, Mr. Bellamy says that the essential features are that the availability of electricity in homes is an absolute necessity and that greater use of it on the lines indicated is both economic and profitable for the consumer and supply authority alike.

The section devoted to overseas conditions consists in the main of tabular information, but the task has been made difficult by the dearth of information, especially regarding average prices charged for domestic electricity. Taking 1948 as the datum year it is indicated that in 1951 the price index in Great Britain and Canada was 103, in the United States 93 and in Sweden 87; when adjusted for changes in the cost of living the respective indices were 87, 87, 86 and 73.

Until ten years ago electric cooking was comparatively neglected in the United States but it has now surpassed Britain in this field. In Switzerland there have been remarkable increases in electric cooking and water heating and a great advance has also been made in Sweden.

Installation Practice

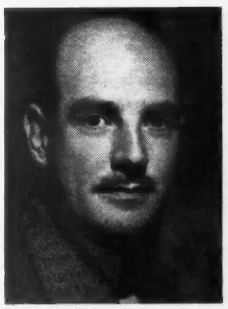
By S. L. M. BARLOW, Associate I.E.E., M.Amer.I.E.E.

MR. BARLOW'S paper on electrical installation practice at home and overseas is so full of practical detail that a summary can give only a general idea of the scope and nature of its contents. The author sets out, as explained in the introduction, to ascertain whether by adopting some overseas methods it is possible to achieve a much-needed reduction in the cost of installation work. The annual value of such work carried out by the private enterprise section of the industry, employing about 45,500 manual workers, is put at about £55·6 million.

After mentioning the advantage of employing a consultant in the planning of an electrical installation, Mr. Barlow says that the cost of the installation is expected to be between 7 and 10 per cent of the total construction cost of a building; with special types of building embodying skeleton-type installations it may be as low as 4 per cent.

The cost of the average installation is fairly equally divided between labour and materials but, having regard to the labour content of the latter, the total labour cost represents 80 per cent of the whole. Raw material prices are much the same throughout the world and so attention is concentrated on pre-planning and conservation of labour.

An analysis of installation work in Great Britain shows that in 1953 there were 4,575 firms employing operatives and 2,376 not employing them. The 45,522 operatives were engaged as to 5,444 on new housing; 6,100 on other housing; 16,456 on new construction other than housing; and 17,522 on other non-housing activities such as maintenance. In countries such as Germany and Holland the output of operatives has returned to the pre-war normal but in Great Britain and other European countries it is still below; in Great Britain it is estimated to be 70 per cent of the pre-war level. In this country safety and reliability of installations are the principal concern while in North America reliability for a reasonable period, coupled with availability of outlets, adaptability and cost are the main considerations. In France adaptability, æsthetic value (decorative effect) and cost are studied; in Germany reliability, adaptability and cost are the most important factors. Cost seems to be the main consideration in South America, the West Indies, Africa, India and British Colonies in the less temperate climates.



Mr. Barlow is immediate past-president of the E.C.A. and is vice-president of the International Association of Electrical Contractors

Mr. Barlow briefly reviews the wiring systems employed in this country and mentions that probably less than 10 per cent of the conduit used is galvanized and sizes of over 2in diameter are seldom employed.

We have little to learn from other European countries in electrical installation practice. Their frequent resort to reduced standards and simplified systems are methods of economy which we cannot follow. But we can still learn much from them in the design of lighting fittings.

In France it is permitted to use conductors without mechanical protection only for temporary installations. Galvanized conduit is not used and metal trunking is seldom seen although a system has been developed which employs a very small section of metal duct with a clip-on cover.

There has been an increase in Germany in the use of all-insulated wiring systems and t.r.s. or thermoplastic sheathed cables are increasingly buried in plaster. This practice is also followed here but the author thinks that the risk of mechanical damage makes it out of keeping with our traditional methods. Reference is made to the employment of conduit comprising thin sheet metal wrapped over an insulating tube which necessitates a special bending tool.

In general Continental contractors' plant and tools are not

so good as ours but one German-made tool is specially mentioned. This is a portable electric hand tool designed for cutting chases up to about 1in wide and 1½in deep. A geared chuck enables it to take a low-speed abrasive cutter or drill for cutting holes to receive switchboxes, plug boxes or fixing plugs. It is unsuitable for concrete or very hard brick.

An unusual system of mechanical protection for conductors used in Italy relies upon pliable rubber or thermoplastic tubes bent by hand after immersion in hot water. The tubes are available in various diameters from about ⅜ to ½in and are covered in with plaster or screed after fixing, the wire being drawn through later. The author sees little merit in this system.

Installations in North America

American and Canadian practice varies in important particulars from the British, but is not necessarily better than or as good as ours. The American National Electrical Code is mandatory only in the case of governmental bodies, whereas the Canadian Electrical Code is fully mandatory and governs the licensing of installation work by the Inspection Department of the Canadian Standards Association.

In America pre-planning of an installation of any size is considered essential and a vast amount of labour and materials is saved thereby, and delays are reduced. Much attention has been given to time study and man-hour times have been worked out for almost every conceivable operation.

The most common method of supply is the 120/208 V three-phase four-wire 60 c/s system but 277/480 V supply is gaining increased acceptance for industrial plants, especially since the introduction of fluorescent lighting. It is standard practice to earth the neutral as well as conduit systems and metal enclosures of apparatus at the consumer's supply point. The use of gas pipes (on the street side) for this purpose is permitted.

A long section of the paper is devoted to American methods of wiring of which there are said to be twenty-one and the section is well illustrated. It is not possible to deal extensively with this in the space available and so we mention some of the principal points. Rigid conduit has threaded joints but electric metallic tube (E.M.T.) is jointed in a number of ways including compression fittings, with which various adaptors are used; and the "indenter" system in which a sleeve slid over the joint is indented by a special tool. The use of galvanized conduit is far more widespread than in Great Britain and a corrosion-resistant conduit is a recent development. The maximum percentage of the cross-sectional area of a conduit which may be occupied by conductors is laid down.

To reduce drawing-in friction conduits are often internally knurled or lacquered. Some manufacturers inch mark their conduit to save measuring and a number of power driven aids are used for threading, cutting, bending, reaming, etc. Some attention is given to threading and several forms of threaders, hand and motor operated, are illustrated.

In spite of a high degree of standardization the Americans still produce a vast number of types of conduit boxes to suit various wiring systems, individual whims and local regulations. Many large buildings in which adaptability is desirable are now constructed with floors made of hollow tube-like cells which provide electric raceways.

Insulated cables incorporating metallic mechanical protection are more extensively used than in this country, with the exception of mineral insulated metal sheathed cables which have only recently been approved. There are three main classes of insulated conductors without mechanical protection. In the case of one of them the Code requires a steel-sheet protection if it is sunk less than 2in from the wall surface. The use of metal trunking is referred to.

Higher lighting intensities than ours are called for in the United States and Americans also install a greater number of outlets. For an average six-roomed house 65 outlets is considered normal.

Greater consideration is given to facilities for altering or extending installations. Fuseboard cases are almost always of metal with adaptable provisions for conduit entry. Small circuit breakers are now used extensively (one manufacturer claims over 15 million in service); they are made so as to be easily clipped in position.

American wiring practice favours joints and tappings rather than the loop-in system. Joints are not allowed in conduit but are allowed, with certain stipulations, in trunking. Unless made with approved solderless connectors, joints have to be soldered and covered with insulation equivalent to that of the conductors and this type of joint is the rule. An example is given of trolley ducting on which lighting fixtures can be slid into any desired position and a trolley-duct collector unit is also illustrated.

This section concludes with a note on the less-substantial nature of the American installation.

Comparisons are made between British electricians' hours of work and rates of pay and those of their American, French and German counterparts. Mr. Barlow considers that no country in the world has a more highly skilled operative than the British nor can he be equalled in production when he puts his back into his work. Satisfactory incentive schemes have not proved possible here. Such schemes are operated in Sweden and Denmark but inquiries have indicated that they are far from satisfactory. The author places his hope of improved output here in the inculcation of skill and pride in their work into apprentices.

In his summing up Mr. Barlow stresses the need for more pre-planning of installations, greater standardization of equipment, more universal use of accepted types of accessories to permit mass production, greater use of mechanical aids, and closer liaison with overseas contractors to enable new methods to be studied and ideas to be interchanged. Joint consideration of these matters by the manufacturer and contractor could also result in increased exports. In the author's view there is a growing demand abroad for sound, well-designed electrical installation materials which could be accelerated if they had a more universal application and were produced at a lower cost as a result of greater standardization.

Boiler Availability

IN a paper published by the Institution of Mechanical Engineers, Messrs. T. E. Houghton and G. Nonhebel (Imperial Chemical Industries) suggest a method of defining the availability of boilers based on net and gross values and on service and output factors. Percentage net availability is taken as $\frac{100H}{T}$, where H represents the total number of hours in which a boiler is available for use, whether steaming or not, between the starting of consecutive statutory surveys, and T represents the total time in that period. The normal frequency of surveys is once in 14 months, which may be extended by permission to 18 months for modern plant, giving 10,000 and 13,000 hours, respectively.

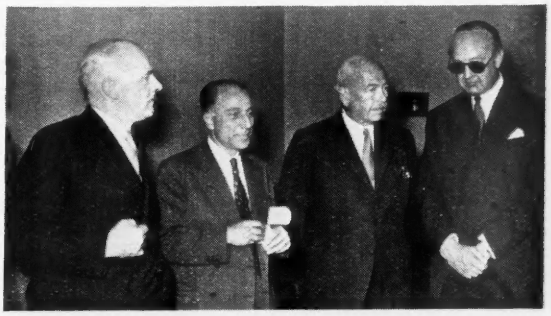
In most B.E.A. stations, however, where surveys are made during the summer, T is from 8,000 to 10,000 hours and the net availability percentage is lower for an apparently similar boiler performance. In calculating gross availability (which shows the effect of forced "outages") the statutory survey period is omitted and the equation becomes $\frac{100H}{T-S}$, where S is the time in hours taken for the survey and overhaul during the period T. Idle boilers if available for service show the highest availability since they do not break down and need the minimum time to survey, so a "service" factor is proposed equal to $\frac{100L}{T}$, where L is the total time in hours that a boiler is in actual service between the commencement of consecutive surveys. It is the same as net availability when the boiler is in service for the whole of the time it is available.

Percentage output factor = $\frac{100w}{W}$, where w is the weight of steam raised between commencement of surveys and W is the weight of steam which could have been raised during that period had the boiler been worked at the manufacturer's maximum continuous rating.

Turkish Power Station Extensions

THE ROLE OF BRITISH ENGINEERING FIRMS

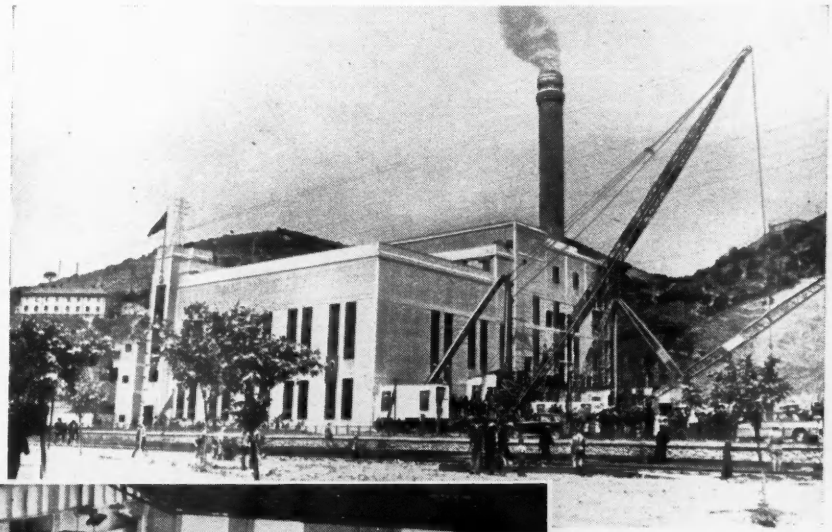
ON 1st June the President of the Turkish Republic, M. Celal Bayar, inaugurated the work on the new large extension to the Catalagzi power station which will be built by the Metropolitan-Vickers Electrical Co., Ltd., together with Braithwaite & Co., who will be responsible for the erection of the exterior building, and by Babcock & Wilcox, Ltd., who will supply the boilers. The Minister of Economy and Commerce, M. Sitki Yircali, and the Minister of State Exploitation, M. Fethi Celikbas, were present at the ceremony, which was also attended by the British Ambassador, Sir James Bowker, K.C.M.G., and by many Turkish and British personalities, including the Governor of Zonguldak, representatives of the ETI Bank, Mr. F. J. Tearle, a director of Metropolitan-Vickers, M. Celalattin Bukey, Metropolitan-Vickers representative in Turkey, and Mr. L. C. Thornton, who is in charge of the new construction.

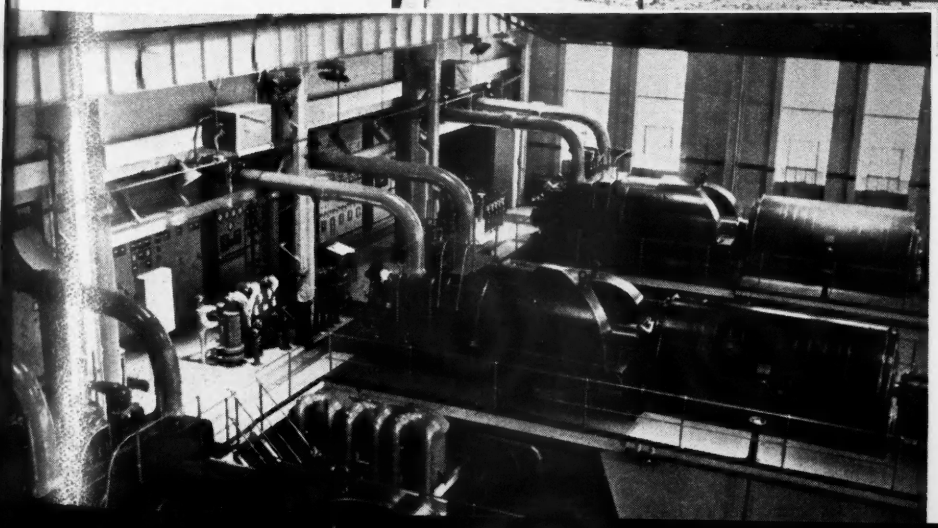


Group at the inauguration of the Catalagzi extension. Left to right: Messrs. F. J. Tearle (director, Metropolitan-Vickers), Cemi Aydineli (director, ETI Bank), L. C. Thornton (Metro-Vick engineer in charge of the new extension) and M. Gale, First Commercial Secretary, British Embassy, Ankara

Metropolitan-Vickers built the original station which was completed in 1948 and went into full operation in 1950. With a capacity of 60,000 kW, the original station has supplied power to the Zonguldak area and Istanbul. The new extension will increase the total capacity of the power station by a further 60,000 kW and increased power will be supplied in due course to Karabuk and Ankara. The value of the contract for the extension is £4 million and the plant is to be ready by March, 1956.

The ETI Bank is responsible for initiating and extending electric power plants in Turkey. Further projects which the bank is sponsoring include the Sariyar hydro-electric station (80,000/160,000 kW) with an 87,000 kW sub-station; the Tuncbilek thermo-electric station (60,000/90,000 kW); the Adapazar-Bursa-Eskisehir overhead line (215 km); the Eskisehir and Bursa sub-stations (53,000 kW); other North-West Anatolian overhead lines (Ankara-Kirkkale-Karabuk-Pasalar-Tuncbilek-Kuthaya-Afyon) total 533 km; and the North-West Anatolian substations, Kuthaya, Afyon, Kirkkale and Karabuk, total 157,000 kW.





Above: The Catalagzi 60,000 kW station. Left: Interior view showing the three Metro-Vick sets

Economics of Steel Production

The Battelle Electric Furnace Report Reconsidered

By J. C. HOWARD*

THE report prepared by the Battelle Memorial Institute and published in July 1953 under the title of "Comparative Economics of Open-Hearth and Electric Furnace for the Production of Low Carbon Steel" has not received the attention in this country that it deserves. It cannot be too strongly emphasized that this report is not a piece of propaganda by electric furnace manufacturers. On the contrary, it was sponsored by a group of fourteen electric utility companies and Bituminous Coal Research, Inc., and, in their own words, their object was "to appraise critically the present and potential competitive aspects of the electric furnace and open-hearth processes for the production of plain-carbon steels of 0·25 per cent carbon maximum." It is impossible not to be impressed with the skill with which this has been done, the sheer mass of material that must have been digested and the clarity with which conclusions have been set out. Nor can anyone, familiar with the standing and integrity of the Battelle Memorial Institute, imagine that they would lend their name to anything that savoured of special pleading or axe grinding. Their reputation is such that they must indeed follow the truth wherever it leads.

The conclusions reached by the report are summarized in Table 1. This gives the capital and production costs for electric furnace and open-hearth shops of comparable output. For convenience the costs have been converted into £ sterling at the conventional rate of $ 2·8 to the £ and to relate to long tons of 2,240 lb.

The figures given for an annual plant capacity of 250,000 tons are those most likely to interest steel-makers in this country and it is, indeed, for this capacity that the figures are most strikingly in favour of the electric furnace. The most obvious difference lies in the capital outlay called for. That needed for an electric furnace shop is little more than half of that required for an open-hearth shop. There is no significant difference in the conversion costs in the two cases, but the net production cost shows an advantage to the electric furnace of no less than £2 10s per ton. This means an annual saving of £625,000, which is 25 per cent on the capital involved.

Since the publication of the Report the figures for 1953 in the U.S.A.[1] show that electric furnace steel has passed the 8 million ton per annum mark—an increase of 20 per cent over 1952. But the significant part is that no less than 52 per cent of that electric furnace output is straight carbon steel. This seems to imply that the American steelmaker has arrived independently at conclusions similar to those drawn by the Battelle Report, since it is obvious that the publication of the Report is too recent for it to have influenced production figures already.

Turning from facts to prophecy, it was forecast at the 1953 annual convention of the Association of Iron and Steel Engineers in Pittsburgh,[2] by no less an authority than Mr. Willard C. Wheeler, that within 25 years 30 per cent of the total U.S. production of straight carbon steel would be made in electric furnaces. This compares with 4·5 per cent for 1953. This prediction was based on the Conkling method of economic forecasting—a method which has been shown, by past experience, to be reasonably reliable.

Mr. A. G. Robiette has given an interpretation of the Battelle Report for British conditions.[3] Dealing only with plants designed for an annual output of 250,000 tons, he finds no significant difference between the conversion costs for electric furnace and open-hearth practice—a conclusion which is in agreement, as we have seen, with that reached in the Battelle Report. Mr. Robiette makes no comparison for the cost of the metallics charge, on the grounds that the price of scrap is complicated by the system of levies employed. The author believes, though, that a comparison, using standard prices as set out in Section B of Table 2, is a useful one.

The corresponding U.S. figures, taken from the Battelle Report, converted to relate to long tons and expressed in £ sterling, are given in Section A of Table 2 for comparison.

Table 2B, it will be seen, gives the electric furnace metallics costs for British practice as 82 per cent of that for the open-hearth furnace. The corresponding figure for U.S. practice is 92 per cent (Table 2A).

The proportions of scrap, pig iron and ore used in Table 2 are those used by the Battelle Report—presumably, although this is not specifically stated in the Report, representative of average U.S. practice. It is, however, true that, although the open-hearth furnace must have some 25 per cent pig iron in its charge to work efficiently, an arc furnace can run just as satisfactorily with no pig at all. If a little extra carbon is needed to give the necessary "ten point" boil, then it is a simple matter to add a few pounds of coke with the scrap. If, then, Table 2 is revised

* Director of the Electric Furnace Co., Ltd.

TABLE 1.—Comparison of estimated capital costs and production costs per ton of ingots for open-hearth and electric furnace shops—U.S. conditions

	ANNUAL PLANT CAPACITY (TONS OF INGOTS)					
	250,000 tons		500,000 tons		1,000,000 tons	
	Open-hearth shop	Electric furnace shop	Open-hearth shop	Electric furnace shop	Open-hearth shop	Electric furnace shop
Capital cost	£4·5 million	£2·6 million	£6·45 million	£4 million	£10·2 million	£6·1 million
Metal cost (cold charge)	£19·0	£17·7	£19·0	£17·7	£19·0	£17·7
Metal cost (hot charge)			£17·2	£16·6	£17·2	£16·6
All other costs (cold charge)	£7·3	£7·5	£6·6	£6·9	£6·1	£6·5
All other costs (hot charge)			£5·6	£6·4	£5·1	£6·1
Net production cost (cold charge)*	£27·1	£24·6	£25·4	£23·8	£24·7	£23·9
Net production cost* (hot charge)			£22·0	£22·6	£21·7	£22·2

* Includes interest, tax and amortization charges and credit for recoverable scrap.

TABLE 2.—Comparison of Metallics Costs (Cold Charge)

A—U.S. Costs

Materials	Price per Ton	Open Hearth		Electric Furnace	
		Weight charged per Ton of Ingots	Cost per Ton of Ingots	Weight charged per Ton of Ingots	Cost per Ton of Ingots
Steel Scrap	£ s. d. 17 4 0	lb 1,865	£ s. d. 14 8 0	lb 2,220	£ s. d. 17 0 0
Pig Iron	23 4 0	622	6 10 0	194	2 0 0
Iron Ore	5 6 0	27	1 4	56	2 8
80% Ferro Manganese	90 0 0	13½	10 10	13½	10 10
Total Metallics ...		2,527½*	21 10 2	2,483½*	19 13 6

B—U.K. Costs (No allowance for levies)

Materials	Price per Ton	Open Hearth		Electric Furnace	
		Weight charged per Ton of Ingots	Cost per Ton of Ingots	Weight charged per Ton of Ingots	Cost per Ton of Ingots
Steel Scrap	£ s. d. 6 6 0	lb 1,865	£ s. d. 5 4 6	lb 2,220	£ s. d. 6 4 0
Pig Iron	14 6 6	622	3 19 6	194	1 5 0
Iron Ore	3 10 0	27	10	56	1 9
80% Ferro Manganese	48 12 0	13½	5 10	13½	5 10
Total Metallics ...		2,527½*	9 10 8	2,483½*	7 16 7

* The difference in the total weight charged per ton of ingots produced between the two types of furnace is due to the greater yield given by the electric furnace.

eliminating the pig iron from the arc furnace charge, the metallics costs for both countries become still more favourable to the arc furnace. For British conditions, this advantage would widen from £1 14s to £2 9s per ton of ingots.

Under present conditions in this country, where the system of levies on the cost of scrap is being used to encourage the use of pig iron rather than scrap, this advantage to the arc furnace is somewhat smaller. The proportions of scrap to pig iron and of " home-produced " to " bought-in " scrap vary so much from works to works that no useful end would be served by adapting Table 2B to allow for the effect of these levies. It is also true that at any time the overall conditions may alter and so call for an adjustment in the system of levies to a position more favourable to the arc furnace.

It is worth noting in passing how these levies, imposed for one purpose, have an unsuspected effect in quite a different direction. In this case, they are altering the conditions artificially in favour of an established routine and tending to retard the coming of a technical and economic advance. Moreover, the fact that they are variable at short notice tends to make planning ahead more of a gamble than it need be.

TABLE 3.—Comparison of estimated capital costs and production costs per ton of ingots for open-hearth and electric furnace shops—U.K. conditions (annual plant capacity—250,000 tons (cold charge))

	Open-hearth Shop	Electric Furnace Shop
Capital Cost	£2,900,000	£1,700,000
Metal Cost	£9·5	£7·8
All other Costs* ...	£5·8	£6·0
Net Production Costs†	£15·2	£13·7

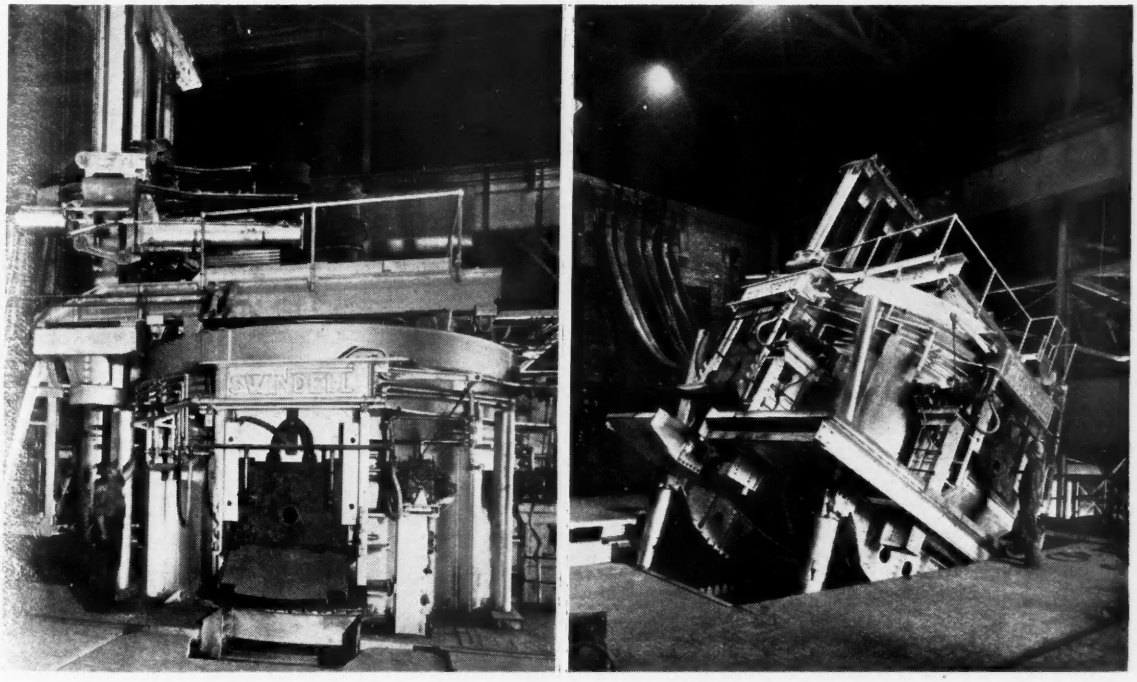
* Includes interest, tax and amortization charges.

† Includes above and credit for recoverable scrap.

Combining the metallics costs from Table 2B with the conversion and capital costs put forward by Mr. Robiette,[3] we can prepare Table 3 for British conditions to compare with Table 1.

Again the capital outlay required for the electric furnace shop is little more than half that required for the open-hearth shop. The net production cost for the electric furnace steel shows a saving of £1 10s per ton, giving an annual saving of £375,000 which is 22 per cent on the capital involved. Expressed as a percentage of the electric furnace net production cost, this advantage in favour of

Large arc furnace of the type envisaged for the kind of steel under consideration. On the right the furnace is shown in the tilted position



the electric furnace is 11 per cent for British conditions as compared with 10 per cent for U.S. conditions.

Rather different considerations will be called into play in the case where one of a range of open-hearth furnaces is due for replacement. To put in an arc furnace instead is still an attractive proposition, even though there will be no saving in the cranes, foundations and building costs, etc. The difference in the capital expenditures called for in the two cases will not be great and this results in the conversion cost being significantly more for the electric furnace than for the open hearth. Table 4 shows how the operating costs compare in a sample case. It will be seen that there is still an advantage to the electric furnace of approximately £1 per ton.

TABLE 4.—Comparison of estimated production costs per ton of ingots for one open-hearth and one electric furnace put into an existing shop—U.K. conditions (annual capacity—100,000 tons (cold charge))

	Open-hearth Furnace	Electric Furnace
Metal Cost	£9·5	£7·8
All other Costs* ...	£4·6	£5·4
Net Production Costs†	£14·0	£13·1

* Includes interest, tax and amortization charges.
† Includes above and credit for recoverable scrap.

Taking a wider view for a moment, it is essential for us in this country to consider carefully the matter of our total reserves of coal. We have no hundreds of years of supplies here such as they have in the U.S.A. and it would be foolish indeed to use the prospect of atomic power as an excuse for making no economies now. Each ton of steel produced in an arc furnace requires approximately 550 lb of low quality coal to be burnt in the power station; each ton of steel produced in the open-hearth furnace needs the best part of 700 lb of high grade low-ash coal to be burnt in the producer-gas plant. In the plant with an annual output of 250,000 tons that we have been considering, this difference will amount to some 16,800 tons per annum. That the open-hearth steelmaker is becoming aware of this problem is shown by the article published recently by Prof. M. W. Thring,[4] in the course of which he expresses the opinion that " the steel-melting process will, therefore, have to make a major contribution to fuel saving, whether this is economic at present prices or not." One of the best ways in which this can be done—and with considerable economic advantage—is to use the arc furnace to replace some of the older, less efficient open-hearth furnaces.

When we come to analyse the conversion costs for the two processes it is at once apparent that the most important items in the electric furnace costs are power and electrodes. Between them, in fact, they account for 47 per cent of the British costs and 37 per cent of the U.S. costs.

Power Costs

Turning first to power, we find that the cost of this item forms 32 per cent of the British costs but only 25 per cent of the U.S. costs. The Battelle Report has used a figure of 0·9 cents (0·77d) per kWh for American conditions. The average cost of industrial power[5] is higher than this (1·07 cents) but the figure used was considered by the electricity supply authorities to be a reasonable one to work on for supplies to arc furnaces. A corresponding cost of 0·8d per kWh has been used for this country.[3] Again this is not the average cost of industrial power over the whole of the U.K., which in 1953 was 1·088d per kWh.[5]

It will be seen that the costs of power to the arc furnace user in the two countries are almost identical and yet the cost of labour to the manufacturers of power in the U.S.A. is probably more than three times that over here, while the cost of coal is approximately 20 per cent higher in the U.S.A. than in the U.K. To avoid any misapprehension, it should be added that the power costs compared are both for electricity generated from coal.

Put another way, a steel melter in the U.S.A. could buy 222 units of " arc furnace " electricity with an hour's work; in the U.K., he could buy only 90 such units. Owing to the far greater spread between domestic and industrial charges used in the U.S.A. (a subject covered in more detail later) this contrast is not so striking when applied to units of domestic electricity. No visitor to America can escape the conclusion that the cost of food and other essentials is high enough to offset much of the Americans' renowned earning power. It is curious, then, that the cost of electric power is not in line with this. Are we to conclude that our production of food and consumer goods is relatively more efficient than our production of electricity?

Strangely enough, a similar position holds for electrodes. The price per lb of graphite is actually a little higher in the U.K. (1s 5d per lb, as compared with $0·18 or 1s 4d per lb). The higher U.S. labour costs are, however, at least partially set off in this case by the cheap hydro-electric power used for graphitization in the U.S.A. The costs of these two items are of vital importance to the electric steel maker. A lowering in their costs of only 10 per cent would result in a saving of 5s 5d per ton of steel ingots produced, which corresponds to £67,500 per annum on the size of plant we are considering.

More Rational System Needed

Quite apart from any hopes we may have of lower power costs generally, much more impetus could be given to the use of electric melting furnaces if the system of charging for power were only a little more rational. It is interesting to note that in 1953 in the U.S.A.[5] the average cost of power to the domestic user was 3·16 that of the most favourable industrial cost. In the U.K., this ratio was only 1·81. When we consider that one 70-ton arc furnace, producing perhaps 95,000 tons of steel per annum, will use more than 50 million kWh per annum and that a plant of 250,000 tons annual capacity will use some 137 million kWh each year for the furnace alone—more than sufficient for the total requirements of a community of 100,000 people—this ratio does seem absurdly low. A highly concentrated load of this nature should surely be accommodated at a fraction of the cost per unit of a dispersed domestic load.

On the other hand it is, of course, true that the cost of power has not increased since 1938 anything like so quickly as the cost of coal. The average price per unit for the domestic user in 1953 was actually slightly less than that charged in 1938, while industrial supplies were increased in the same period by 68 per cent. Again it is not clear why the domestic user should have been so favoured but it remains true that 68 per cent is a comparatively modest advance. It is reasonable to assume that this divergence in cost trends between electricity and other sources of heat will be maintained and so strengthen the case for the arc furnace.

The relative proportions of domestic power and industrial power consumed have been variously quoted. Obviously they vary between district and district and between town and town. But if we assume that the total domestic load equals the total industrial load then the average cost of all power sold in the U.S.A.[5] will be 1·96 cents or 1·68d per kWh. On the same assumption the average cost of all power sold in the U.K. will be 1·27d per kWh, which is 76 per cent of the U.S. figure.

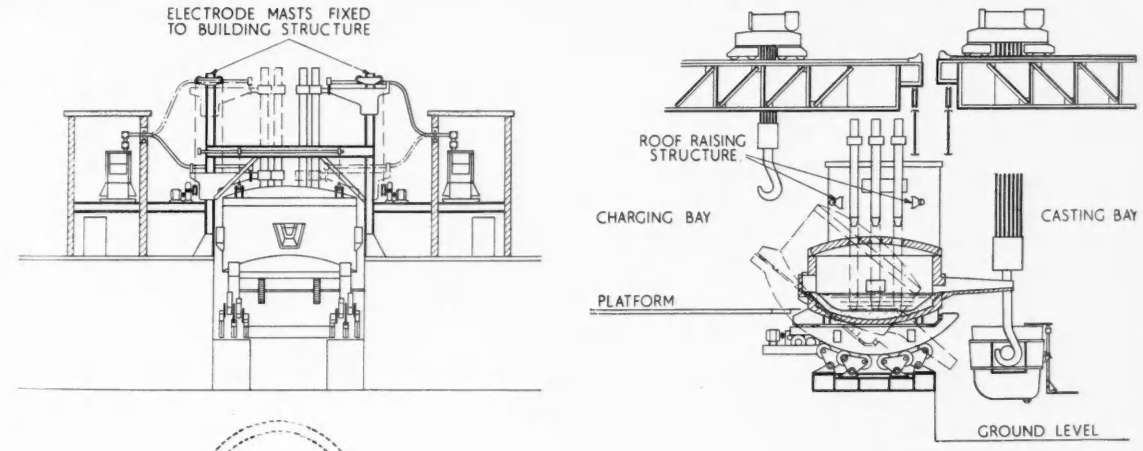
When it is remembered that the domestic user takes a

very peaky single-phase load, a load which almost disappears at night, and is metered at low voltage while the industrial load is usually a balanced three-phase one, often metered at high voltage, it is suggested that the industrial user is subsidizing the domestic user, a subsidy which is, perhaps, not necessary from the purely commercial aspect, since the domestic user will always be there but the industrial user has to be encouraged. Moreover, the large industrial user such as the large arc furnace user, whose power requirements may be in the tens of thousands of kilowatts, is subsidizing the smaller user, measuring his power in hundreds of kilowatts, if both pay on the same industrial tariff. With the tariffs now in operation for large consumers of electricity there is ample justification for them to put down their own generating plant.

It must, however, be remembered that large arc furnaces taking very high loads during the melting periods and very much lower loads during the refining periods can, in isolated units, cause embarrassment to the power supplier, but the lower grade steels under discussion need a much shorter refining time than the "quality" steels now associated with the arc furnace. Encouragement could be given to the installation of several furnaces with staggered operational cycles by high maximum demand charges with correspondingly reduced unit charges. Of necessity the operation will carry on 24 hours a day and due recognition of the night load should be given in the adjusted tariffs envisaged.

Siting of Steelworks

Arising from the consideration of power costs is the question of the geographical situation of these new electric furnace melting shops that we envisage. Probably the first arc furnaces for plain carbon steels will be installed in existing open-hearth shops but, when they have so proved themselves, the specialized electric furnace melting shops that we hope will result need not, surely, be sited in areas that have up to now been regarded as the centres of open-hearth steel production. Rather it seems possible that the steelmaking will follow cheap power wherever it may be found and with modern developments in hydro-electric and atomic power this may not be in conventional areas. Maybe it is too late to suggest that the local price of power should continue to bear some relation to its local cost of production and distribution, but it should surely be in line with modern thought to fix the price of power arbitrarily to encourage industry to specific situations. Something on these lines has, we know, been done to encourage alternative industries in what were the distressed areas, but it has always seemed a weakness in these schemes that the alternatives attracted were wholly "light" industries employing largely women and girls. Surely the



Suggested arrangement of a large body run-out arc furnace up to 200 tons, suitable for installation in existing open-hearth shop. The dotted lines give alternative positions of the body when run-out ready for charging

N.E. coast or Clydeside would be suitable places for one of these plants? The metallurgical skill required to produce plain carbon steel by the single slag process in an arc furnace is not really comparable with that required to produce the complicated, clean and highly refined steels for which the arc furnace is so justly famous.

It seems to the author that there is available quite enough evidence on economic grounds alone to encourage full-scale developments now on the lines suggested, especially in view of the encouragement to new investment given by the recent Budget. Mr. Robiette has pointed out[3] that there are other advantages—not solely economic—in favour of an arc furnace installation. It is, for example, much more flexible. Arc furnaces can be readily shut down and restarted; they can run on small charges; they can run on short time, or single shift; they can be easily transferred to double slag working for the production

of low sulphur high grade steels; and there is only half the capital tied up.

One point that has not been sufficiently stressed is the improved working conditions that the arc furnace offers. Not only is the work somewhat less arduous than on the open-hearth furnace but also it is fundamentally more interesting. The operator has always close control of the process involved; he can feel that he has a thoroughly modern piece of equipment under his control; there is plenty of scope for him to use his intelligence and the more he does so the better the melter he will be. This means that the arc furnace will attract and hold the more able and intelligent men.

All this discussion must seem rather academic to the ultimate user who naturally wants a good product as cheap as possible, but if it is true, as the author believes, that competition between producers is the surest way of giving the consumer a fair deal, then it seems clear that competition between open-hearth and electric furnace steel-makers must result in their looking closely at their respective costs in their efforts on the one hand to maintain and on the other hand to secure their markets. It looks reasonably clear that conditions in the future are going to favour the electric furnace even more strongly in this competition. But now is the time for a start to be made. A more rational view of power costs could turn this "stream" of new activity into a "flood" with very great advantage to the national economy.

References

[1] *Iron Age*, 7th January, 1954.
[2] *Iron Age*, 15th October, 1953.
[3] *Iron and Coal Trades Review*, 27th November, 1953.
[4] *Iron and Coal Trades Review*, 2nd April, 1954.
[5] *Electrical World*, January, 1954.

Tariffs—Facts and Fancies

Reduced Costs follow Reduced Charges

By C. F. MATTHEWS, B.Sc., A.M.I.E.E.

THE theme that the electricity tariff structure is unrelated to costs is periodically voiced in political quarters and the recent pamphlet "Change is Our Ally" by a group of Conservative M.P.s again demands that price be exactly equated to costs. Underlying such reasoning is the assumption that "costs," apart from the impact of variations in coal, materials, efficiency, etc., is a fairly static phenomenon and an unfailing yardstick for determining tariffs. Particularly as regards domestic tariffs—singled out for major criticism—is this complete reversal of fact. Cost per unit, which is the important factor, is far more sensitive to tariffs than tariffs are to price trends of related materials.

Nowhere has this point been brought out with more force than when in previous political attacks on tariffs—this time in the United States—a Congress Committee was called upon to investigate accusations levelled against the Tennessee Valley Authority of establishing uneconomically low tariffs. Though Senator McCarthy has drawn unflattering attention to such official investigations, they have on occasion uncovered invaluable facts. Such was the case in the T.V.A. investigation.

This investigation ranged far and wide for relevant evidence on the way costs *followed* tariffs. It had long been recognized within the industry in the United States that as consumption rose, so the price could drop, but, in 1935, the deliberate use of tariffs to lower costs was not so generally accepted, and it was possible for the president of a New York supply company to be quoted as saying that "If we knew how to double the present use of electricity immediately we could make rates equal to the proposed municipal plant. But we don't know any magic way to produce any such immediate increased use of electricity, and we have employed every known legitimate method of promotion."

The municipal plant in question was the system which the then Mayor of New York, Mr. La Guardia, threatened to set up in competition in the same territory, and to quote the evidence:—"The threat brought a rate reduction which enabled residential consumers to get all current over 125 kilowatt-hours per month for 2 cents a unit. The result was beneficial rather than harmful to the company, which is now quite boastful about its promotional rate schedule." In other words, the lowering of tariffs was automatically reducing the costs of the supply company in terms of units.

From New York the investigators turned to evidence from Canadian utilities. The largest private system in Canada, the Montreal Power Company, was charging 12¾ cents per unit for domestic use when a small residential suburb of Montreal, Westmount, established a rival system and cut rates to 10 cents. So started a price war with a result which the official evidence presents thus:—"Throughout the period in which the small plant was leading its big competitor through successive rate reductions, the company's prosperity was increasing steadily. Even during depression years the market value of an original 100 dollars invested in its capital stock was over 500 dollars, and it was paying in annual dividends equivalent to 27 dollars on each 100 dollars of original investment."

Again costs per unit were being led by the nose by tariffs and incidentally securing the largest possible output from the smallest input, a concept recognized by all professional economists as using the nation's resources to the best advantage in the public interest. Mr. Lyon, a well known economist, told the Investigating Committee that "a buyer should be in a position to purchase, at any time, at as low a price as anyone will offer at that time. No one has ever presented another plan so well calculated to make the resources of the nation at all times give the largest total yield to all the people as this plan of economic organization."

The converse—the pushing up of prices—inevitably brings about high costs, especially in fields of such elasticity as the residential power market. Failure to recognize this fact was, the Investigating Committee concluded,

one of the shortcomings of American utilities. "The traditional approach of private industry," said the report, "has been to establish rates which cover as far as possible the entire costs of service immediately, and gradually to reduce rates over the long period required to develop the market under such rate policies; in other words to make the rate payer earn his rate reduction in advance." The evidence was held to show that the only policy corresponding with sound economics was to "first reduce your prices to levels which will enable consumers to absorb greatly expanded production and the resulting expansion in demand will mean lower costs which will justify your prices economically."

Making consumers cover costs excessively in the first increment of block tariffs is also deprecated as "anti-promotional." Theoretically attractive, there is nevertheless a psychological brake on consumption. The Ontario Hydro-Electric Commission's 34th annual report confirmed this when it stated:—"The Commission has found that the maximum economic limit of the first domestic use through rural power districts is 6 cents per kWh."

Of this Commission the Investigating Committee said:—"Its history shows that this theory of rate making has provided a constant incentive to the most economical and efficient management." Years later the 40th annual report could confirm this by stating that "Credit for the reduction in average cost belongs chiefly to the promotional form of modern rate schedules. . . . Under such promotional rate schedules, provided the initial rates are not too high, there is established a beneficial cycle of increased use leading to lower average costs which, if passed on to the consumer in the form of lower rates or prices, start a repetition of the cycle."

Any "monkeying" about with tariffs as suggested in "Change is Our Ally" can do untold harm, not only to the industry and all within it but to the nation too. Nobody, within or without the industry, can determine with anything approaching certainty what costs are incurred by any one class of consumer. The industry is not composed of watertight compartments and loss of consumption in one sector can adversely affect other sectors. Artificially raised tariffs cannot but lead to the intensification of the burden of the fixed charges borne by the industry and consequently to the burdens of a nation whose competitive power depends increasingly on holding down costs.

To politicians there may be difficulty in realizing that a low unit charge is obtained not by unfair allocation of costs but by exploiting well-known economic principles. No better summing up could be obtained than the often quoted explanation of T.V.A. tariffs by its world-famous ex-chairman, Mr. David Lilienthal, when he said that "one principle of pricing for power must be clearly recognized or the entire significance of the T.V.A. electricity programme is obscured: the tariff charged for electricity, within wide limits, determines the cost. No analysis of tariffs for domestic electricity is worth serious consideration unless it is based on this principle."

Australian Market for Heavy Electrical Equipment

THE competitive position of the United Kingdom in the Australian market for heavy electrical machinery is dealt with in a report prepared for the Board of Trade by the United Kingdom Senior Trade Commissioner in Australia.

He says that two years ago many national schemes of development were put in abeyance because of lack of funds arising out of balance of payments difficulties. There has since been some release from this hold-up, particularly in respect of works of an essential type. On private account, works of development (especially oil refineries) have been considerable in the past year or so. On the evidence available (easing of balance of payments difficulties and continued industrial development) the trend of total demand seems likely to be upward, but at a pace tempered to the condition of national economy. In Queensland, however, apart from an order for a turbo-alternator of 30,000 kW and two boilers of 150,000 lb/hr to be placed by the Southern Electric Authority in the next six months, there are no orders for major items known as likely to be placed for three or four years. It has been authoritatively estimated that this year the whole Commonwealth will need about £A.20 million of turbo-generator equipment and about £A.2½ million of switchgear, etc., from overseas. Doubtless orders have already been placed for most of this, and orders for 1955 will probably be lower, in view of the state of most power projects.

After reviewing the position of the United Kingdom in the markets for the various classes of heavy electrical machinery, and indicating those in which foreign competition is growing, the Senior Trade Commissioner makes some observations on prices, delivery terms, credit and the general standing and reputation of the United Kingdom. He says that its prices are generally competitive, but where the competition is especially active Continental prices are for the most part lower. Continental delivery terms are in many cases of shorter date, which gives them the advantage where delivery is a vital factor. The present tendency is for Government and semi-Government authorities to refrain from entering into long term contracts. This often has the result of preventing United Kingdom and Australian manufacturers from meeting the delivery terms. It has been remarked that United Kingdom concerns partially manufacturing in Australia have better deliveries than others.

Whilst in the past there has been talk of Continental firms offering extended terms of payment (up to five years) evidence that this has so far been availed of in Australia is lacking. There are no pointers suggesting that United Kingdom credit terms are the cause of any loss of business.

The general standing and reputation of the United Kingdom remains very high, but criticism has been made that in many instances promises of delivery have proved unreliable and that there has been some lowering in the standard of workmanship and finish of United Kingdom goods.

Water Power in Anatolia

THE Projects Department of the Turkish Ministry of Public Works is considering plans for the supply of electricity to northern Anatolia, involving the construction of hydro-electric plants at Almus on the Yesilirmak river; Kazankaya on the Cekerek, a tributary of the Yesilirmak; Obruk on the Kizilirmak river; and at Kargl. So far only the sites at Kazankaya, Obruk and Kargl have been chosen and the projects are under consideration. In addition, plans for a hydro-electric plant to be built at Gökirmak-Tasköprü have been studied and specifications have been sent to the Minstry of Public Works for approval. It is understood that the Iller Bank, Ankara, which will in due course be inviting tenders, will be pleased to receive inquiries from United Kingdom firms. Any firms responding are asked to notify the Export Services Branch of the Board of Trade (Ref. E.S.B. 12406/54).

LETTERS TO THE EDITOR

Letters should bear the writers' names and addresses, not necessarily for publication. Responsibility cannot be accepted for the opinions expressed by correspondents.

Voltage-Change Query

I AM informed that when the London Electricity Board wish to change their network from non-standard to standard voltage, they adopt a procedure in regard to consumers' equipment which in my opinion has very doubtful merit.

If, for example, a consumer possesses fluorescent fittings made by Firm "A," equipped with untapped chokes, then the Board may, as they think fit, supply auxiliary or replacement chokes made by Firm "B." Such a principle is applied to all equipment so changed, and thus proprietary brands bearing well-known trade marks, often carefully selected by the purchaser, are without his knowledge being turned into bastard assemblies.

I cannot believe that this interprets the intention of the Act because, in spite of any guarantee given by the Board, the consumer is deprived of the benefits of his original selection, and in some cases even of the manufacturer's guarantee.

No less provoking is the Board's arbitrary decision to carry out this kind of work themselves, so ignoring the relationships between consumers and their contractors, who may be held responsible for their electrical maintenance; and split responsibilities such as arise in these circumstances are most unsatisfactory.

I would be most grateful for any views from your readers, having particular regard to both consumers and manufacturers.

*London, E.C.*4. J. MORTIMER HAWKINS,
Managing Director,
Mortimer, Gall & Co., Ltd.

Electrification of British Railways

I WOULD like to congratulate the *Electrical Review* on the excellent series of articles which were published in the issue of 21st May. At the same time, however, I must express keen disappointment at the apparent lack of vigour which all the authors displayed in setting out the advantages of the electrification of British Railways. These advantages were set out in a lukewarm and unattractive manner and in such circumstances would have very little chance of ensuring Government support. I therefore, with all respect to the authors, set out in what I consider to be a more attractive and convincing manner a list of the advantages which they claim in their articles.

All the authors are agreed that complete electrification of this country's railways would lead to a saving of $9\frac{3}{4}$ million tons of coal per year, but not one of them says what this means in cash so let us clear up this point at once. The uneconomical steam locomotive burns the best and most expensive coal which cannot cost much less than 80s a ton, so that the annual saving in cash is nearly £40 million. It is truly remarkable that each author omitted to mention this striking sum of money and, equally, what this sum would represent if capitalized over a period of years. Another serious omission in all the papers is a statement as to how the country's economic position can be improved by the export of the coal which would be saved by electrification.

Mr. Noddings is to be congratulated on focusing attention on atmospheric pollution; he estimates the railways' contribution at £20 million per annum out of a total national figure of £100 to £150 million atmospheric losses. Mr. Noddings, however, does not make any mention of the recent "smog" scare when questions were asked in the House about the atmospheric conditions around London. This is surely a most striking psychological advantage.

Mr. Smart's contribution is based on practical experience of electrified operation and clearly illustrates that we may expect more efficient and speedy operation under electrification.

Summing up, therefore, we can say that now that the three great advantages of railway electrification have been spotlighted, it is reasonable to expect a minimum saving of £60 million per annum by complete electrification. This sum of money, if capitalized, would surely meet the cost of conversion whilst the coal saved could be sold for export and thus assist in an improvement of our national economy.

Is it too much to hope that, with the aforementioned evidence before them, the Government, through the Ministries of Fuel and Power and Transport, will now give the railway and electricity supply industries a lead and set out a programme to be started at once and complete electrification within a period of five years? This is a target which can be achieved if there is the will to do it.

"ELECTROMOTIVE."

Shortage of Engineers

THE explanation of the shortage of electrical engineers discussed in a recent number is perfectly simple. Only the fervent enthusiast will spend years serving an apprenticeship and getting a degree or H.N.C. or passing the I.E.E. examinations, when by entering the Civil Service as a boy clerk he can, if he is reasonably bright and hard working, look forward to a career culminating in 15–20 years as a chief executive officer on £1,300 a year without having to pass a single examination.

The clerical Civil Service, banks, insurance companies and business houses now attract too great a proportion of brains and talent which would be better employed designing or producing the top quality electrical equipment we will need to sell in the future if the country is to continue to make a living. When the export trade is declining because our designs are out of date the masses of bright clerks and "commercial gentlemen" will be of little help to us.

"OLD TIMER."

Lampholder Troubles

I HAVE every sympathy with Mr. W. V. Barnett's letter on the above topic in your issue of 4th June. The continuous intense heat from the lamp expands the lower half of the bakelite jacket, inevitably leading to cracking and jammed rings, although they can sometimes be freed by pouring a drop of oil between the threads.

Often, however, the expansion leads to the complete break-up of the offending article and the lamp coming away with the inner brass lining. The bakelite lampholder is without doubt the weakest link in the chain of electrical household accessories; it is more than surprising that holders complying with the relevant B.S. suffer from the

same objectionable features. Installation engineers should press strongly for a revision of the offending British Standard.

Hendon, N.W.4. M. NEIDLE.

MAY we suggest to Mr. W. V. Barnett that he substitutes brass lampholders for the moulded types, at present in use, to obviate the trouble experienced.

Birmingham. W. S. MANSELL,
Managing Director,
REEVES & Co. (BIRMINGHAM), LTD.

HAVING had the same difficulty experienced by Mr. Barnett in removing the shade rings from the present moulded type of lampholder, perhaps a useful suggestion will save him the trouble in the future.

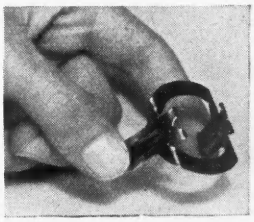
On purchasing a new lampholder, remove the ring (which is often not easy), smear the slightest trace of vaseline on the thread, run the ring on and off a couple of times when it will usually turn quite easily, and I do not think he will have any more trouble removing the ring at some future date.

Welling, Kent. J. F. PERRIN.

[A similar letter, advocating the use of oil, has come from Mr. T. E. Hayes (London, S.W.7).—Editors, *Electrical Review.*]

ON page 1055 of your issue of 4th June a correspondent refers to the difficulty of removing shade rings from Bakelite lampholders. As far as my experience goes, there would appear to be only one real remedy and that is to use a "Utility" shade clip.

This, unfortunately, is not used by any lampholder manufacturer as a standard but is readily obtainable and I have pleasure in enclosing samples which you might care to send on to your correspondent.



"Utility" shade grip

I would add that though originally designed for brass lampholders, the "Utility" shade clip will accept all Bakelite holders that I have tested it on.

London, W.C.2. E. R. MORTON.

Lord Citrine's Review

Power Supply in 1953–54

TAKING advantage of the presence at the British Electrical Power Convention of many representatives of the electricity supply industry, the British Electricity Authority held a conference last Monday at which Lord Citrine, the chairman, gave his customary review of the position.

He said that in the year ended 31st March last over half a million new consumers were connected, raising the total to nearly 14½ million and consumption was 6·9 per cent above the 1952–53 figure. Although, at 1,413 MW (sent out), the capacity of new plant commissioned was lower than in the preceding year, it was anticipated that the upward trend would be resumed in 1955 and would rise to 1,950 MW. Since vesting day 6,206 MW of plant had been added.

The 1959 programme would include 200 MW turbo-alternators with 1,400,000 lb/hr boilers operating at 2,350 lb/sq in and 1,050 deg C with reheat to 1,000 deg. These sets were to be installed at the new High Harnham station on the River Trent about ten miles from Newark.

Overall thermal efficiency of generation last year was 23·22 per cent, against 20·87 per cent at vesting date, representing a saving of four million tons of coal, costing £12 million. To expedite repairs of plant and further improve availability the Authority had decided to install a limited number of its own central workshops and plans for the first two were being worked out.

After stating that during last winter there was only one power cut and only 26 reductions of frequency and voltage, Lord Citrine mentioned that the peak load occurred on 2nd February last amounting to 15,430 MW.

Dual Firing Plans

Because of possible coal shortage the Authority was considering the use of dual firing (coal or oil) at the Marchwood (Hants) station and was examining the position in respect of 16 other stations on river estuaries. Close contact has been made with the Atomic Energy Authority and members of the B.E.A. engineering and technical staff would be trained in the design, construction and operation of nuclear power reactors.

The first 40 miles of the 275 kV supergrid was inaugurated last July and valuable information had been gained from the cross-Channel cable-laying trials made last summer. The 15 MW gas turbine at Trafford Park was undergoing trials and the 100 kW wind-power plant was nearing completion.

During 1953–54 the number of farms connected was 12,941; by 1958 a further 60,000 would be connected and by 1963 another 45,000. Eight Electricity Boards had published standard off-peak or restricted hour tariffs. The bulk supply tariff for 1954–55 had been fixed at £4 15s per kW of simultaneous m.d. with a running charge of 0·5d/kWh and a coal clause adjustment of 0·00065d per penny variation from 60s a ton.

District heating and similar schemes were under consideration at Bloom Street (Manchester), Spondon, Stepney and Warrington and the economies of the Pimlico scheme were being closely investigated.

Larger Surplus Anticipated

It was expected that the surplus for 1953–54 would be substantially larger than in previous years. Lord Citrine mentioned the proposed increase of the Authority's borrowing powers from £700 million to £1,400 million.

Referring to staff matters, Lord Citrine said that there were now 185,000 employees in the industry—an increase of 1·9 per cent over the previous year. It was probable that voluntary superannuation for manual workers would be approved and the subject of the employment of older men and women was being examined.

The address was concluded with mention of the amalgamation of the Merseyside & N. Wales and North Western Divisions and to the Scottish Electricity Bill which would incidentally provide for the changing of the Authority's name to the Central Electricity Authority.

Birthday Honours

Major-Gen. L. B. Nicholls

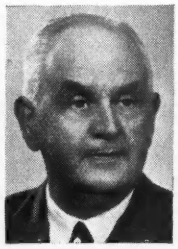
Mr. I. A. R. Stedeford

Mr. T. E. Goldup

Mr. V. A. Pask

Mr. F. H. Lister

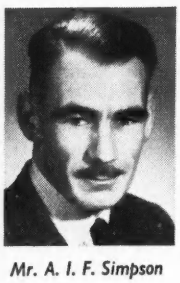
Mr. J. C. Mitchell



Mr. W. T. Gann

Mr. S. H. Lines

Mr. F. Rostron



Mr. A. I. F. Simpson

THE names of a number of men in the electrical and allied industries are included in the Birthday Honours List which was published last week.

MR. W. A. WOLVERSON, Director, External Telecommunications Executive, G.P.O., becomes a Companion of the Order of the Bath (C.B.); MAJOR-GENERAL L. B. NICHOLLS, C.B., C.B.E., chairman, Cable & Wireless, Ltd., is made a Knight Commander of the Order of St. Michael and St. George (K.C.M.G.); and MR. I. A. R. STEDEFORD, chairman and managing director, Tube Investments, Ltd., becomes a Knight Commander of the Order of the British Empire (K.B.E.).

New Commanders of the Order of the British Empire (C.B.E.) include MR. T. E. GOLDUP, director of Mullard, Ltd.; MR. H. G. HERRINGTON, managing director, High Duty Alloys, Ltd.; MR. W. I. JONES, Director-General of Research, National Coal Board; MR. V. A. PASK, chief engineer, Headquarters, British Electricity Authority; and MR. H. TONGUE, for services as chief engineer, Atomic Energy Research Establishment.

The following become Officers of the Order of the British Empire (O.B.E.):—MR. W. E. CLEAVER, manager, Cable & Wireless Engineering School, Porthcurno, Cornwall; MR. W. M. HAMPTON, Ph.D., B.Sc., F.I.E.S., managing director, Chance Bros., Ltd.; MR. F. H. LISTER, a managing director of R. A. Lister & Co., Ltd., and a director of Blackstone & Co., Ltd.; MR. J. C. MITCHELL, divisional controller, North Eastern Division, British Electricity Authority; MR. A. T. SMALLEY, Assistant Director, Contracts Department, G.P.O.; and MR. E. A. SACKEY, deputy chief electrical engineer, Gold Coast.

Members of the Order of the British Empire (M.B.E.) include the following: MR. C. E. ADDIS, B.E.M., assistant works manager, Bulpitt & Sons, Ltd.; MR. D. L. BROWNLOW, director and chief engineer, Mirrlees, Bickerton & Day, Ltd.; MR. F. N. CALVER, engineer-in-charge, Daventry Transmitting Station, B.B.C.; MR. R. H. J. CARY, senior experimental officer, Radar Research Establishment, Ministry of Supply, Malvern; MR. V. G. CRITCHLOW, area engineer, Sheffield Telephone Area, G.P.O.; MR. I. A. DALGLIESH, chief radio officer, British European Airways Corporation; MR. W. T. GANN, for services as district manager (Southport), Merseyside and N. Wales Electricity Board; MR. C. E. LEE-JONES, district engineer, Derby District, Derby and Burton Sub-Area, East Midlands Electricity Board; MR. R. D. LANSER, superintendent of Radio Maintenance, British Overseas Airways Corporation; MR. S. H. LINES, general works manager, A. C. Cossor, Ltd.; MR. F. ROSTRON, export sales manager, Ferranti, Ltd.; MR. J. H. SAUNDERS, assistant electrical manager, Harland & Wolff, Ltd.; MR. G. C. SCOTT, manager, Naval Test Department, Evershed & Vignoles, Ltd.; MR. A. I. F. SIMPSON, senior engineer, General Electric Co., Ltd., Coventry; MR. H. G. THORNLEY, lately executive engineer, Telephone Manager's Office, Post Office, Blackburn; and MR. G. W. WILSON, sales director, Belmos Co. Ltd.

The following awards of the British Empire Medal (B.E.M.), have been made:—MR. H. R. BATCHELOR, foreman, Submarine Cables, Ltd. (Goodmayes); MR. W. J. B. CHAPPLE, carpenter and joiner, Eastern Electricity Board (Cambridge); MR. W. G. COLLINS, assistant superintendent, Telegraph Branch, London Telecommunications Region, G.P.O. (Uxbridge); MR. J. E. EVANS, shift charge engineer, Dolgarrog hydro-electric station, Merseyside and North Wales Division, B.E.A. (Llandudno); MR. J. GRIEVE, leading linesman, South West Scotland Electricity Board (Johnstone, Renfrewshire); MR. A. HAWKESWORTH, mains foreman, London Electricity Board (Romford); MR. R. G. H. HOWARD, field research engineer, Davey, Paxman & Co., Ltd., Colchester; MR. P. H. JONES, mechanic examiner, Inspectorate of Electrical and Mechanical Equipment, Ministry of Supply (Deptford); MR. G. J. LINDSAY, foreman, Pressed Steel Co., Ltd. (Paisley); MR. W. MCCALLUM, draughtsman, Glenfield & Kennedy, Ltd. (Kilmarnock); MR. W. PEMBERTON, jointer, North Western Electricity Board (Oldham); MR. F. E. T. POWELL, technical officer, Tunbridge Wells Telephone Area (Tonbridge); MR. H. SCAIFE, installation inspector, North Eastern Electricity Board (Scarborough); MR. C. WALKER, foreman electrician, Cabot Carbon, Ltd. (Ellesmere Port); MR. T. WATSON, instrument maker, Radar Research Establishment, Ministry of Supply (Malvern); MR. E. J. WINKWORTH, leading turbine driver, South Division, British Electricity Authority (Reading); and MR. A. WRIGHT, leading stoker, Stoke power station, Midlands Division, B.E.A. (Hanley).

E.I.B.A. Manchester Branch

The annual general meeting of the Manchester & District Branch of the Electrical Industries Benevolent Association was held at the Engineers' Club, Manchester, on 31st May and it was agreed that the branch be reconstructed on a broader basis. An Advisory Committee representative of all branches of the industry was elected, and the following officers were also elected:—Chairman, Mr. H. Cobden Turner, J.P.; vice-chairman, Mr. F. C. Barford; hon. secretary, Mr. H. Etchells; hon. treasurer, Mr. A. D. Compston; hon. relief secretary, Mr. A. H. Owen; hon. assistant relief secretary, Mr. R. T. Greenwood.

PERSONAL AND SOCIAL

News of Men and Women in the Industry

THE Lord President of the Council has appointed **Sir Hugh Beaver,** M.I.C.E., M.I.Chem.E., to be chairman of the Advisory Council for Scientific and Industrial Research in succession to **Professor Sir Ian Heilbron,** D.S.O., D.Sc., LL.D., F.R.I.C., F.R.S., who retires on 30th September next on completion of his term of office. Sir Hugh has been a member of the Advisory Council since 1952.

Sir **Harold Roxbee Cox,** chief scientist of the Ministry of Fuel and Power since 1948, is resigning from the public service on 30th June in order to take up appointments in the engineering industry.

Mr. John Parr-Morley, president-elect of the Electrical Power Engineers' Association, has resigned as honorary secretary of the London Technical Group of the E.P.E.A. on account of his expected heavy commitments in Association affairs next year. He has held the hon. secretaryship for 30 years. **Mr. W. H. Reed** succeeds him.

Mr. A. E. Grimsdale, B.Sc.(Eng.), special assistant, sales management, Metropolitan-Vickers Electrical Co., Ltd., has been appointed a director of the Metropolitan-Vickers Electrical Export Co., Ltd. From 1946 to 1953 he was the traction sales manager, and he has recently visited Rio de Janeiro in connection with the £7,000,000 order for electric rolling stock for the Central Railway of Brazil.

Mr. A. E. Grimsdale

Mr. **G. C. Walton** has been appointed sales manager at the metal works of McKechnie Bros., Ltd., in Rotton Park Street, Birmingham, as from 1st July. Mr. Walton has been manager of the company's Newcastle-upon-Tyne branch for many years.

Mr. **R. J. Chapman,** a departmental manager in the Industrial Sales Division of the Rugby organization of the British Thomson-Houston Co., Ltd., has retired. Mr. Chapman joined the staff of the B.T.H. Works Drawing Office in 1910 and in 1914 was appointed head of the Pinion Department. A few years later he joined the staff of the Industrial Sales Department of which he became manager in 1944. Recently a gathering was held at the Grand Hotel, Rugby, to bid him farewell. During the evening Mr. Chapman was presented with a cheque, subscribed to by some of his many friends. The presentation was made by Mr. J. S. Ramsden, formerly director of B.T.H. sales, with whom Mr. Chapman was associated for many years, and who visited Rugby specially for the occasion. In addition to the cheque an autograph book was given to Mr. Chapman, bearing the signatures of friends.

Mr. F. R. Livock, T.D., B.Sc.(Eng.), M.I.E.E., A.M.I.Mech.E., has been appointed sales director of Metal Industries (Electrical Division), Ltd., which includes Brookhirst Switchgear, Ltd., Igranic Electric Co., Ltd., and Cantie Switches, Ltd. Mr. Livock joined the Metal Industries group last October on resigning from the position of controller, education and personnel services, with the General Electric Co., Ltd., which appointment he had held since rejoining the company from the Forces in 1945. Before the war he was in the G.E.C. sales organization. His earlier training experience was with the Metropolitan-Vickers Electrical Co., Ltd.

Mr. F. R. Livock

The Ministry of Supply announces that **Mr. L. H. G. Sterne** has been promoted to the rank of deputy chief scientific officer and has been appointed head of the Naval Air Department of the Royal Aircraft Establishment, Farnborough.

The Brush Group, Ltd., announces that **Mr. V. J. Chalwin,** the chairman and managing director of Brush Electrical (Australia) Pty., Ltd., and British Oil Engines (Australasia) Pty., Ltd., the marketing subsidiaries of the group in Australia, has tendered his resignation with effect from 31st May. Mr. Chalwin has been with the Brush Group in various appointments for the past eleven years.

Mr. A. P. Quarrell, A.M.I.Mech.E., A.M.I.Mar.E., who succeeds Mr. Chalwin, has been appointed chairman of British Oil Engines (Australasia) Pty., Ltd., and managing director of Brush Electrical (Australia) Pty., Ltd. He has been with the Brush Group for many years and was managing director of Associated British Oil Engines (Export), Ltd., from 1945 to 1949. Mr. Quarrell will be arriving in Australia in August. **Mr. J. E. Costell,** who has been associated with British Oil Engines (Australasia) Pty., Ltd., for the past twenty-three years, becomes managing director of that company.

Mr. M. E. Hayes has been appointed director and general manager of Le Carbone, Ltd. He was previously in charge of the carbon brush side and has now taken control of the company.

Mr. W. R. Abram, Weald district manager of South Eastern Electricity Board, has retired and he has been succeeded by **Mr. W. J. Collins,** formerly deputy manager.

The President of the Board of Trade has approved the appointment of **Mr. J. L. Girling,** a superintending examiner in the Patent Office, as Comptroller-General of Patents, Trade Marks and Designs in the place of the late Sir John Blake. Mr. Girling joined the Patent Office in 1921 and has worked there throughout his career apart from a period of war service with the R.A.F.

Mr. J. S. Makin has been appointed manager of the Manchester office of British Insulated Callender's Cables, Ltd. He joined the old British Insulated & Helsby Cables, Ltd., in 1921 as assistant in the testing section of the Contract Department at Prescot, and became assistant engineer on power transmission construction in 1926, in which capacity he was concerned with both underground and overhead installations, including 132 kV grid line construction work. From 1950 until his new appointment he was attached to the Home Sales Department at the Middlesbrough branch office.

Mr. J. S. Makin

Mr. T. G. Scott, formerly sales supervisor for Fusarc, Ltd., has joined British Engineering Overseas as representative in the North Eastern area.

Mr. W. Eyers and **Mr. L. R. Matthews** have been appointed directors of the British Driver-Harris Co.,

Ltd. Mr. Eyers joined the company in 1921 and since 1950 has been sales manager in respect of the whole of the company's products. Mr. Matthews joined the company in 1946, becoming secretary and accountant.

Mr. F. E. Richardson has joined the staff of Wandleside Cable Works, Ltd., as manager of the South, South Western and South Midlands areas. Mr. Richardson was recently district installations engineer with the Southern Electricity Board. He received his technical education at Leeds Technical College and his early training was with the Metropolitan-Vickers Electrical Co., Ltd., and Greenwood & Batley, Ltd., Leeds.

Mr. F. E. Richardson

At a meeting of the board of the Electric Construction Co., Ltd., held at Wolverhampton on 10th June, the directors appointed **Mr. J. C. Milne,** M.I.E.E., M.Amer.I.E.E., to the board as technical director. Mr. Milne joined the company in 1934 as rectifier engineer, successively holding appointments as chief rectifier engineer, switchgear and rectifier manager and assistant general manager.

Mr. W. F. Smith has been appointed deputy sub-area engineer at the Exeter headquarters of the Devon Sub-Area of the South Western Electricity Board. Mr. Smith, who is at present district engineer, joined the Plymouth Corporation Electricity Department in 1928. He is chairman of the Devon Section of the Electrical Power Engineers' Association.

Mr. C. H. Fagg retired recently from the position of deputy district manager of the Thanet District of the South Eastern Electricity Board.

In spite of the rain some 8,000 people, families of members of the staff, attended the sixth annual "At Home" day at the Witton Works of the **General Electric Co., Ltd.,** on 29th May. The visitors saw demonstrations of high-voltage phenomena, testing of domestic appliances, long range photocell equipment and aerodrome floodlights. Tea was served during the afternoon.

The Southampton Works of the **Pirelli-General Cable Works, Ltd.,** recently held its first "Family Open Day." Over 2,500 employees, relatives and friends took advantage of the opportunity to visit the works and witness the many varied manufacturing operations. Added interest was provided by exhibits depicting the works' welfare, social and sports activities. Films and exhibits of particular interest to the layman also contributed to making this initial venture a success.

Despite inclement weather the programme at the annual sports meeting of the Northmet Sub-Area of the **Eastern Electricity Board** held at "Woodcroft," Winchmore Hill, on 12th June, was carried out with little deviation. An Enfield Athletic Club team competed, as well as entrants from Essex and Cambridgeshire and from eleven local branches. The 100 yards event brought a new champion in Mr. W. Poyser, who equalled the record for this meeting. The home team beat Essex in the mile relay, and the Enfield A.C. went up from third to first place in the mile walk. Miss J. Plater from the scratch mark returned a record time for the 80 yards handicap. The club championship was won by Hertford district from New Southgate. Standard Telephones lent sports gear and their officials helped on the track.

OBITUARY

Mr. R. Wilson Smith.—The death occurred on 9th June at the age of eighty-two, forty years to the day since he founded the Electrical Wholesalers Federation, of Mr. R. Wilson Smith, the first president. He was to have attended the celebration luncheon at the Dorchester Hotel next week and had, on the evening before his death, prepared a message of good wishes to the Federation. After completing his training at Faradays in Birmingham, Mr. Smith joined Drake & Gorham, Ltd., in 1895. He retired as managing director of Drake & Gorham (Wholesale), Ltd., in 1948, and was presented with a silver cup by the Council of the E.W.F. at a farewell luncheon in June of that year. He convened the first general meeting of wholesalers on 9th June, 1914, and was elected chairman, and became the first president of the Federation, holding that office throughout the 1914-18 war. He continued to serve on numerous committees until the late 1930s.

The late Mr. R. W. Smith

Mr. Osbert F. Francis, M.I.E.E., electrical engineer and general manager of the Kirkcaldy electricity and tramways undertakings from 1902 until his retirement in 1938, has died at Croit-E-Caley, Colby, Isle of Man, at the age of eighty.

Mr. W. de Renzi.—The death occurred on 28th May at the age of sixty-seven of Mr. W. de Renzi, B.Eng., who was well known in the motor control gear industry and had written many technical articles on the subject. He was for the past twelve years engaged as senior research engineer in the Electrical Department of the Expanded Metal Co., Ltd., at its Stranton Works, West Hartlepool.

Mr. Robert Green, district engineer of the North Western Electricity Board at Settle, died suddenly on 28th May at the age of forty-two. Mr. Green, who was born in Liverpool, received his technical education at Leeds Technical College and from 1946 to 1948 he was distribution engineer with the Settle & District Electric Co., Ltd. On nationalization he became assistant district engineer at Settle, being appointed district engineer in 1949.

WILLS

Mr. R. A. Pantlin, vice-chairman of Thomas Wallis & Co., Ltd., and a director of Thomas Wallis & Co. (Wholesale), Ltd., the General Cable Manufacturing Co., Ltd., and other companies, who died on 9th December last, left £124,538 gross (£95,125 net).

Mr. Christopher Wade, a director of Gabriel, Wade & English, Ltd., who died on 1st February, left £15,995 gross (£15,712 net).

Mr. H. R. Darrah, formerly managing director of Baxendale & Co., Ltd., who died on 11th October, left £31,555 gross (£30,594 net).

Mr. J. C. Arkless, director and secretary of A. Reyrolle & Co., Ltd., and a director of several other companies, who died on 1st February, left £28,407 gross (£26,123 net).

Mr. S. Harding, head of the Electric Motor Department of Bulpitt & Sons, Ltd., and a director of B.K.B. Electric Motors, Ltd., who died on 21st February last, left £6,302 gross (£5,134 net).

Mr. W. J. Markham, formerly a director of Berry's Electric, Ltd., who died on 4th December last, intestate, left £2,266 gross (£2,174 net).

Mr. J. Stephen, late station superintendent at Chamber Hall power station, Bury, who died on 14th December last, left £17,227 gross (£16,978 net).

Mr. J. W. Stevens, co-founder of Express Lift Co., Ltd., and London Metal Warehouses, Ltd., who died on 9th February last, left £3,662 gross (£3,496 net).

Mr. H. J. C. Cole, production officer of the Instrument Department of Crompton Parkinson, Ltd., who died on 8th February last, left £2,074 gross (£2,005 net).

Mr. W. F. C. Skewes, founder and chairman of W. Skewes & Co., Ltd., who died on 29th November last, intestate, left £2,015 gross (£1,776 net).

Mr. T. C. Futers, managing director of the Yorkshire Electric Detonator Co., who died on 10th December, left £2,571 gross (£2,374 net).

Mr. F. Robinson, for many years in charge of industrial sales of Santon, Ltd., who died on 18th April, left £3,423 gross (£1,441 net).

Engineering in Europe

Abstracts from Foreign Technical Journals

THE laws of incidence and probability of backfire in mercury-arc rectifiers can be well interpreted on the basis of results of investigations of thermal and secondary electron emission from graphite anodes and of the gas desorption from these anodes. These effects are particularly marked during the initial working period of rectifiers or after sustained interruptions of service. There is a striking similarity between the exponential desorption curve and the law of probability of the arcbacks, verified on adsorbing materials whose external conditions (temperature, ambient pressure) remain constant after an initial variation resulting in desorption, this also applying to anodes of mercury-arc rectifiers working in constant operating conditions.

A sudden temperature rise of the adsorbent or fall of the pressure of the adsorbate is corresponded to by a sudden rise in the quantity liberated by desorption, as confirmed by the isobaric and isothermal adsorption curves. The adsorption rate, however, follows an exponential law more freely the slower the diffusion through the pores in the graphite. To this corresponds the probability variation of the occurrence of arcbacks which shows sudden rises when the stressing of the graphite increases.

The character of the variation of the desorption rate dx/dt as function of the temperature is similar to the relation between frequency of arcbacks and temperature of the graphite, especially if the combined effect of desorption and electron emission is considered. The product of the ordinates of the corresponding curves representing the probability of arcbacks agrees qualitatively with experimental findings for not excessive anode temperatures (below 1,000 deg C). At higher temperatures of the graphite the phenomena are complicated by further effects such as higher thermal emission, cathodic disintegration of the graphite, etc.—" The Effect of Electrographite on the Arcbacks of Mercury-Arc Rectifiers," J. Kramar, *Elektrotechn. Obz.*, Vol. 43, pp. 95–102, No. 2, February, 1954, in Czech.

Auto-Valve Surge Divertors

The available test data on corona-electrodes consisting of cylinders of thin steel sheet show that this type of electrode has high dry flashover voltages at 50 c/s and low impulse flashover voltages. For use with auto-valve surge divertors annular corona-electrodes were found suitable. The tests with this type revealed that the wet flashover voltages or flashover voltages in a dirty condition are not higher than those of rod or horn gaps of the same sparking distance.

A surge divertor with external corona gap has higher impulse breakdown voltages owing to the high capacitance of the corona gap. These voltages may be reduced by putting a screen on the cap of the divertor. This screen has the same effect where horn gaps are used. However, as this screen also reduces the breakdown voltage of the divertor itself, it must not be used without making sure that the reduced breakdown voltage is still higher than the recovery voltage of the system.

The use of a corona gap is recommended when it can be protected against moisture. The impulse characteristics of "hetinax" divertors vary when the fibre becomes dry (e.g. during varnishing) and rise above the permissible values. They return to their original values when the fibre absorbs sufficient moisture. Such divertors should not be erected immediately after varnishing and drying of the cylinders, but only after 2–3 weeks' storage.—" Use of Corona-Electrodes as External Spark Gap of an Auto-Valve Type Surge Divertor," E. V. Kalinin, *Elektrichestvo*, No. 1, pp. 50–53, 1954, in Russian.

Transformer Noise

The authors deal only with the " magnetic " noises of transformers, known as " hum " and mainly due to vibrations of the cores and windings set up by magnetostriction. The magnetostrictive forces result in elastic strains not linearly proportional to the flux density; thus a sinusoidal variation of the flux will produce a periodic, but an harmonic, variation of the elongation and contraction, respectively, of the core sheets (therefore a *noise* and not a *sound*). This noise may be considerably amplified by resonances.

A comparatively simple approximate method for calculating the acoustic intensities and noise levels produced is presented. The greatest danger, to be avoided in all circumstances, is resonant transverse oscillations of the yokes or cores. The only effective remedy against transformer noises would be a considerable reduction of the flux densities and this is out of the question because it is not economic. However, magnetostriction itself may be reduced by the use of oriented-grain types of transformer sheets; otherwise, acoustic screening is the only substitute for prevention of the noise at the source.—" The Origin of Transformer Noises," H. Rothert and H. Jordan, *E.T.Z.(A)*, Vol. 75, No. 4, pp. 107–109, 11th February, 1954, in German.

Mine Signalling Systems

In systems with an earthed outer an earth fault current through a defect of the non-earthed outer cannot be distinguished from the normal load current. This makes any control of the insulation in service impossible. On the other hand, operation of a non-earthed system has the advantage that even a single-phase earth fault causes no fault current, unless two phases are faulted. The latter is a rare occurrence if the system insulation is properly supervised.

The principles of various types of automatic insulation controls are discussed, starting with the simplest device, the so-called two-lamp insulation tester which, however, fails to indicate symmetrical short circuits. More elaborate set-ups with current-limiting instrument circuits, time-controlled two-way relays (thermal), alarm relays and delayed cut-outs are described, including a simplified type with a biased rectifier as current-limiting element. For this purpose a germanium rectifier is particularly suitable.—" Automatic Earth-Fault Supervision of Signalling Systems in Mines," R. Gunther, *E.T.Z. (A)*, Vol. 75, No. 5, pp. 188–190, 1st March, 1954, in German.

Readers who require accurate full translations of any of the articles abstracted in this section can be put into touch with the translators who will supply them at current rates.—Editors, *Electrical Review*.

European Power Problems

THE Committee on Electric Power of the United Nations Economic Commission for Europe held its eleventh session in Geneva from 24th to 26th May under the chairmanship of Mr. Ake Rusck (Sweden), who was re-elected chairman for the year. Mr. S. Han (Yugoslavia) and Mr. M. Visentini (Italy) were re-elected vice-chairmen and Mr. L. Postler (Czechoslovakia) was also elected vice-chairman. This was the first time in history that the countries of all parts of Europe had surveyed together developments in the electric power situation. Besides discussing many technical and legal aspects of power supply the delegates from twenty-one countries agreed to put on the agenda for the Committee's next session consideration of the effects on the European power economy of the introduction of atomic energy as a source of electric power.

The government representatives adopted unanimously a resolution aimed at facilitating inter-State agreements on the building and operation of hydro-electric plants on rivers that flow across frontiers. The Committee received and took note of reports on international action for the development of Austrian hydro resources for power exports and for installing a pumping station in Luxembourg. It also received a report by a group of experts on the prospects of exporting electric power from Yugoslavia. The report described recent activities of " Yougelexport," the body set up by the group for detailed studies of the questions concerned. The " Yougelexport " Economic Committee has almost completed its work, but has still to clarify market conditions in relation to the construction costs worked out by the Technical Committee. The latter has prepared detailed reports on the four projects adopted and on the development in three stages of a transmission network for the export of power, particularly to Austria, France, Italy and Western Germany.

The Turkish representatives requested the ECE secretariat's assistance in solving a problem, similar to that of the development of Yugoslav hydro-electric resources and electricity exports, which the country faces in the development in eastern Turkey of the Tigris and Euphrates Rivers, which are also of interest to the neighbouring countries of Iran, Iraq and Syria. These three countries are outside the purview of the ECE but, subject to their governments consenting to the secretariat acting as intermediary, the Committee endorsed the request.

On the proposal of the Soviet Union delegation, the Committee requested the secretariat to prepare a document embodying general information on the development of d.c. transmission. Again on a proposal of the Soviet Union delegation, the Committee asked the secretariat to investigate the possibility of studying domestic electrification.

The Committee asked its group of experts for the study of legal problems to go more particularly into legal and administrative measures for promoting the development of international power movements. It instructed the secretariat to follow carefully the development of the legal problems which may arise from international action to develop the hydro-electric resources of a particular country and their use for internal and international purposes. The Committee further asked the secretariat to complete its documentation on arbitration clauses in contracts for the sale or exchange of electric power with a view to deciding whether it is desirable to establish a standard clause. In connection with its continuous study of the gross hydro-electric potential of Europe, the Committee adopted a first list of definitions of terms used in hydrology.

The Committee called for a continuation of work by a group of experts and the secretariat on methods employed for the determination of electric power consumption forecasts. The aim is the preparation of a comparative study of the methods used, and not the determination of the forecasts themselves. The purpose is to facilitate an exchange of information among the various countries and to make available to the less industrialized countries the experience gained in this field.

All representatives described the main trends in the electric power situation in their countries during the past year and delegations were invited to submit to the secretariat a written report to serve as the basis for discussion during future plenary sessions of the Committee. The secretariat will bear this information in mind when drawing up the text of future survey,s which it is considered should be published annually.

The Committee took note of the final edition of a two-volume ECE study on rural electrification to be published soon. It was decided that work on this aspect should continue in two ways: firstly, by encouraging the dispatch of missions from the U.N. Technical Assistance Administration to countries which request them (in which connection it noted that such a mission had already been sent to Turkey); and secondly, by pursuing the study of a number of specific rural electrification problems through the medium of its working party already set up for this purpose.

The secretariat reported on the work of the Sub-Committee on Electric Power of the U.N. Economic Commission for Asia and the Far East (ECAFE) and on co-operative efforts of the secretariats of ECE and ECAFE and the Economic Commission for Latin America. The Committee approved the secretariat's efforts in this field and recommended it to continue to maintain close contacts with the other regional commissions on electric power matters. It also asked that it should be supplied with information concerning the organization of a proposed mission of electric power experts from countries participating in ECAFE to visit electrical equipment manufacturing plants and power stations in Europe in order to familiarize themselves with the latest developments. The ECAFE had earlier been informed that a mission of this kind, financed by the U.N. Technical Assistance Administration, might be feasible in 1955.

Commonwealth Engineering Conference

IN accordance with a decision taken at the previous meeting held in Johannesburg in 1950, the Conference of Engineering Institutions of the British Commonwealth met in London from 24th May to 4th June, the Institutions of Civil, Mechanical, and Electrical Engineers acting as hosts.

Salient features of the Conference are that it is essentially advisory and provides a means by which views can be freely exchanged between senior officers of the institutions concerned on the methods by which the institutions they represent can best work together to further the aims for which they are severally constituted. No less important, the Conference provides opportunities for close personal contacts between eminent engineers of the countries represented.

In the course of its ten business sessions the Conference discussed a number of matters of interest to its constituent institutions, their members, and the public whom they serve. These ranged from such matters as the proper conservation of natural resources to more detailed questions touching the education and training of professional engineers, the assistance which the engineering profession can give in the provision of adequate numbers of fully competent engineering technicians, and measures to secure the most effective interchanges of lecturers and speakers on engineering subjects.

Recommendations to the councils of the constituent institutions were drawn up and when these have been approved by the councils they will be published in the journals of the institutions.

The delegates to the Conference also participated in a number of social engagements. At a dinner to mark the ending of the Conference the visiting delegates expressed their appreciation of its work and their conviction that the decisions arrived at would be of the greatest benefit to the engineering profession and to the public at large.

The next meeting of the Conference will take place in Australia in 1958 at the invitation of the Institution of Engineers, Australia, supported by the New Zealand Institution of Engineers.

VIEWS on the NEWS

By REFLECTOR

TURNING back to the *Electrical Review's* account of the first National Electrical Convention in 1935 (the second did not take place until 1949) I find that the attendance was put at 2,500. Of this total the municipal electricity supply authorities provided 615, the companies 89, the electrical contractors 213 and B.E.A.M.A. 170. It will be seen that the contractors took a larger share than they have done in the present series. There were only two papers, "Industrial Power Supply" by Messrs. C. D. Taite, Harold Hobson and F. Forrest, and "Domestic Electrical Development" by Miss (now Dame) Caroline Haslett and Messrs. T. E. Alger, W. N. C. Clinch and C. Nadaud. There was also the presidential address by Mr. E. E. Hoadley and a symposium in which representatives of the various sections expressed their views. Many of the problems then brought forward are still with us nineteen years after but in several respects we can report advance. For example, in the "domestic" paper all the authors spoke of the necessity for a proving house for appliances. Now we have the excellent new E.D.A. Testing House at Leatherhead. On the other hand most of the suggestions put forward on behalf of the contractors by Mr. T. E. Alger have made little headway.

* * *

There is nothing new under the sun, it is said, and attempts to store the sun's heat for future use are not novel. One of the philosophers of Swift's Laputa was said to have been engaged for eight years upon a project for extracting sunbeams out of cucumbers. Now, however, *Reuter* reports that the United States Air Force has found a more credible method of storing the sun's energy and turning it into electricity for the home. This "solar generator" uses cadmium sulphide processed into crystal and it is claimed that "a thin sheet of this crystal measuring 4ft by 15ft would supply enough current for a normal house." This follows upon a recent announcement that the Bell Telephone Laboratories had produced a solar battery capable of directly converting sunlight into electrical energy.

* * *

Asking questions in the House of Commons on the standards of illumination in school classrooms, Mr. G. Longden objected to the "verbiage" employed in the Ministry of Education's regulations on the subject. He particularly disliked the use of the "lumen" which the regulations defined as

> "the luminous flux emitted in unit solid angle by a uniform source of artificial light giving a luminous intensity of one candela."

Mr. Longden suggested that it would be sufficient to say "in simple English" that lighting should be such as appeared reasonable for the purpose in the opinion of the head teacher and, if necessary, to H.M. Inspectors. But opinion is a poor substitute for measurement and while I appreciate Mr. Longden's difficulty with the lumen and the candala (which perhaps remind him of "*Lucus a non lucendo*") I agree with the Minister who said that architects and those engaged in building schools understood these things.

* * *

There are many ideas which are revived at more or less regular intervals. One is the illumination of towns by means of searchlights, an idea arising out of the effects sometimes observed when military searchlights are in use. The new Mayor of Bolton again put the suggestion forward at a meeting of the Town Council. In the first place, of course, such a system would need a regular cloud-layer reflector a requirement which it is fairly easy to satisfy in industrial Lancashire. But then the reflected light would be quite inadequate unless an inordinately large number of searchlights, each probably representing between 10 and 20 kW and requiring regular attention, were employed. Not a very economical method.

* * *

The series of full-page "recruitment" advertisements in the *Manchester Guardian*, to which I referred recently, has continued. They have included one by the National Coal Board which stressed the Board's need for mechanical and electrical engineers as well as trained engineers in other branches. The Board offers a hundred university scholarships a year, including some in mechanical and electrical engineering. In another advertisement, Mullard, Ltd., drew attention to the immense future before the electronics industry and mentioned its comprehensive training schemes and other aids to betterment. Yet another was that of the English Electric Co. which drew attention to the variety of occupations available within the group and explained the method of entry.

* * *

Dissatisfaction has been aroused among some religious bodies (as I have recorded) by the way in which some Electricity Boards charge churches and chapels for their supply. Sometimes the ordinary commercial tariffs are applied although it is pointed out that the load is largely off-peak. At the same time, of course, these places of worship have a low load factor. However that may be, I hope Electricity Boards will not indulge in the kind of discrimination mentioned in a recent letter to the *Sunday Times*. In this the writer says that the Cwmbran U.D.C.'s list of water charges includes the items:—"Chapels (Baptist) £1 per annum; chapels (other) 10s per annum."

* * *

After attempts had been made over a number of years to obtain electric street lighting, the first street lamp was recently switched on in Worston Road, Highbridge. The parish, I notice, bears the name of Burnham Without.

INDUSTRIAL NEWS

Trade with China

AT A PRESS CONFERENCE last week Sir Norman Kipping, director-general of the Federation of British Industries, and Mr. P. Tennant, F.B.I. overseas director, spoke on steps which were being taken to expand trade between China and Great Britain. In conjunction with Government Departments, Sir Norman Kipping said, a list had been prepared of goods which could be exported from this country to China.

The list, which is published in the *Board of Trade Journal* of 12th June, includes domestic electrical appliances, domestic radio equipment, bell equipment, lamps, fans, lifts and escalators, house meters, arc lamp carbons and air compressors. It is noted that licences are required for all goods exported to China.

Instrument Industries Exhibition

Next year's British Instrument Industries Exhibition promises to offer an even more ambitious programme than before. It is to be held at Earls Court, London, from 28th June to 9th July, 1955. The exhibition will cover all spheres of instrumentation in pure and applied science. It will embrace temperature, pressure and flow controllers; navigation equipment; medical instruments; industrial photography and all instruments used in scientific research.

Colour Television

Colour television cathode-ray tubes are to be made in England under an agreement signed in New York last week between Thorn Electrical Industries, Ltd. (Ferguson Television) and Sylvania Electric Products, Inc. Mr. Jules Thorn, chairman of Thorn Electrical Industries, stated last week that a new company owned equally by Sylvania and Thorns was being set up to develop colour television in Great Britain. All the patents of Sylvania would be available to the new company, which, under the name of Sylvania-Thorn Colour Laboratories, Ltd., would begin work at once in premises on the outskirts of London.

Australian Imports and Exports

Australian imports of dynamo-electric machinery, appliances and equipment during the September quarter of 1953 totalled £A6,567,000 in value against £A4,643,000 in the corresponding period of 1952. The biggest increase—one of approximately 50 per cent—took place in the most important group namely dynamo-electric machines; the only decreases were in batteries and accumulators and heating and cooking appliances. The accompanying statement compares the values of the main groups in the two quarters.

Class of Goods	September quarter 1952 £A(000)	September quarter 1953 £A(000)
Batteries and accumulators ...	131	99
Cable and wire, covered ...	640	699
Communication equipment, including radio	509	664
Dynamo-electric machines ...	1,253	1,895
Heating and cooking appliances	82	75
Lamps, filament	34	256
Protective equipment	64	123
Regulating, starting and controlling equipment	739	1,018
Sparking plugs	57	100
Transformers and rectifiers ...	695	1,045
Electrical machinery and appliances, n.e.i.	439	593

During the same period Australian exports of dynamo-electric machinery and electrical appliances and equipment totalled £A519,000 in value compared with £A494,000 during the corresponding period of 1952. Last year's total included batteries and accumulators £A108,000 (£A86,000) and communication equipment £A134,000 (£A195,000).

Irish Fair Trading Rules

The Fair Trade Commission of the Irish Republic has given notice, in accordance with the provisions of the Restrictive Trade Practices Act, 1953, that it is its intention to make fair trading rules in respect of the supply and distribution of certain commodities including dry batteries. A draft of the proposed Rules may be obtained on application to the Secretary of the Commission at 50, Upper Mount Street, Dublin.

Electrical Disputes

The 42 electricians employed by the Edinburgh Corporation Lighting Department who have been on strike for ten weeks have now returned to work after a meeting between a sub-committee of the Corporation Works and Mr. F. Foulkes, general president of the Electrical Trades Union. A joint statement on behalf of the Corporation and the Union intimated that Mr. R. Vallance, over whom the dispute had occurred, was again in full membership of the E.T.U. on the Union's terms and in accordance with its constitution. It was pointed out that the dispute was not a question of a " closed shop " and the settlement did not imply acceptance of such a principle.

It was reported on Monday that the strike at the Cadby Hall and Greenford establishments of J. Lyons & Co., Ltd., had been extended to all electricians employed by the company at its hotels, teashops, maintenance depots and small factories in the London area. About 450 men are now said to be on strike. A statement issued on behalf of a " rebel " committee opposed to the strike declared that the Communist leaders of the Union had decided to ignore the democratic decision made at a meeting on 31st May when these men had voted by an overwhelming majority against joining the strike. The strike, which began on 21st April in protest against the employment of a non-union supervisor, was recognized by the Union on 10th May. On behalf of the company it was stated on Monday that maintenance work on refrigerators, conveyor belts, lifts, lighting and power was being undertaken by electrical supervisors.

Brit.I.R.E. Convention

At the Convention of the British Institution of Radio Engineers which is to be held from 8th to 12th July at Christ Church, Oxford, thirty-two papers will be discussed all dealing with the application of electronics to industry. Delegates from many parts of the world, including Australia, Canada, Eire, France, Holland, India, Pakistan, and the United States of America will be attending the Convention.

Dynamic Couplings

In the caption relating to the needle loom drive at Petmar Industries on page 1057 of our 4th June issue, the size of the motor should have been given as 22½ h.p. instead of 2½ h.p.

Prices of Materials

In the accompanying table we give the basis prices of the more important materials used in the electrical industry. The figures given are the selling prices and are those quoted on Tuesday last.

ALUMINIUM Ingots	ton £156 os od
COPPER, H.C. Electro	ton £238 10s od
Fire Refined 99·70%	ton £237 os od
Fire Refined 99·50%	ton £236 os od
COPPER Tubes ..	lb 2s 3¾d
Sheet	ton £299 15s od
H.C. wire and strip ..	ton £272 os od
LEAD, English ..	ton £99 5s od
Foreign	ton £98 os od
MERCURY	flask £90 os od
TIN, block (English) ..	ton £725 os od
ZINC, G.O.B. Foreign	ton £78 os od
Electrolytic	ton £88 2s 6d
BRASS Tubes (solid drawn)	lb 1s 10¾d
Sheet	ton £245 10s od
Wire	lb 2s 6¼d
PHOSPHOR BRONZE Wire	lb 3s 9⅜d
PLATINUM	oz £30 os od
RUBBER, No. 1 R.S.S. spot	lb 19¼d–19½d

Television in Channel Islands

The B.B.C. is putting in hand arrangements for the provision of a television service to the Channel Islands. A receiving station will be set up at Torteval on the south-west coast of Guernsey. This station will use

high gain directive receiving aerials for the reception of the high power television transmitting station at Wenvoe, near Cardiff. An alternative aerial system directed on to the Alexandra Palace television transmitter will also be erected at Torteval. By arrangement with the General Post Office the received picture will then be transmitted by radio link to Les Platons on the north coast of Jersey. At Les Platons a television transmitter operating on 61·75 Mc/s vision and 58·25 Mc/s sound, with a power of ½ kW, will give a service to Jersey, Guernsey and Sark. It is expected that Alderney will also receive a service. It is hoped that this installation will come into regular service within a year.

Steel Mills Plant Order

The Metropolitan-Vickers Electrical Co., Ltd., has received an order, worth over £750,000, for three mill drives for the Lackenby works of Dorman, Long & Co., Ltd., comprising a 40in roughing mill, a 53in universal beam roughing mill and a 53in universal beam finishing mill. It is hoped that the new mills will be operating and producing universal beams in September, 1956. To ensure this programme being kept there will be the closest collaboration between Metropolitan-Vickers and its associate, the British Thomson-Houston Co., Ltd. The two companies will share in both the design and manufacture of this equipment, which will be built in their respective works at Trafford Park and Rugby. Each of the three mills will have as a main drive a double armature main motor of 24,000 h.p. peak, and in addition each of the beam roughing and finishing mills will have a supplementary stand powered by a twin drive rated at 8,100 h.p. peak.

Radio Equipment for Syria

Marconi's Wireless Telegraph Co., Ltd., and International Aeradio, Ltd., have together secured a substantial contract for radio communication and direction-finding equipment from the Ministry of Defence of the Republic of Syria. This contract, which was obtained for Britain in the face of strong foreign competition, entails the planning and engineering of a complete radio communications network, which is to include automatic and manual v.h.f. direction-finding stations (both mobile and static), with associated v.h.f. ground/air communications facilities. A training school for personnel of the Syrian Air Force is also to be provided, the two companies being responsible for every phase of this, from the planning of buildings and the provision of technical equipment down to the ultimate details such as exercise books for the students.

Marconi's will supply the equipment, and International Aeradio, Ltd., the specialist staff and training facilities in Syria itself. In England, the Marconi College will also be used for the training of Syrian personnel.

Railway Electrification

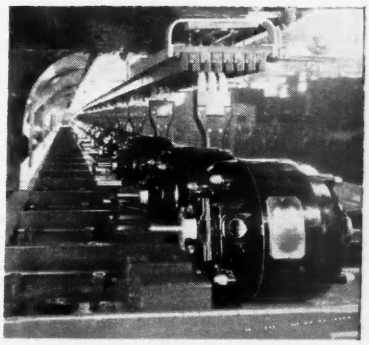
Mr. C. M. Cock tells us that there is a mistake in his article "Electrification of British Railways" in the *Electrical Review* of 21st May. The figures for gross revenue and fixed assets quoted are not correct when referring to British Railways alone. For the year 1952 the fixed assets of British Railways are shown in the article as £1,467 million and gross revenue £620 million, but these are, of course, for the British Transport Commission. British Railways' gross receipts were £403 million and no figure for their fixed assets is given in the published accounts. In spite of this mistake, however, the force of the argument still remains.

North Region Television Studios

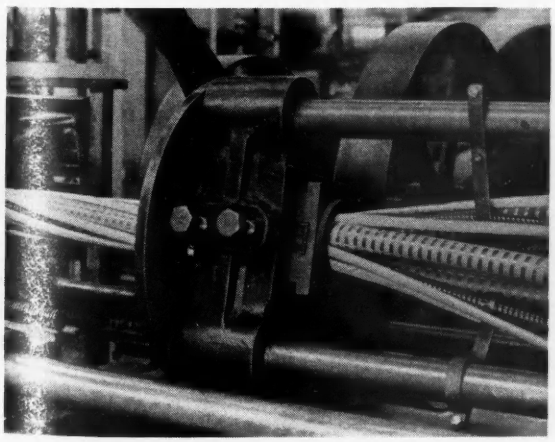
The B.B.C. is to adapt premises in Dickenson Road, Manchester, to serve as the permanent television studios of the North Region, at least until such time as a new headquarters, incorporating television studios, are built. The Dickenson Road premises will be the first B.B.C. television studios outside London. For some time to come the cameras and control equipment will be of the mobile type and will be taken as required from the mobil econtrol room sserving the North Region. Permanent static gear will not be available until a considerably later date.

F.H.P. Motor Manufacture

In 1945, when a decline in military needs was evident, the directors of the British Thomson-Houston Co., Ltd., set in motion a plan to change over the Newcastle-under-Lyme works from armaments to f.h.p. motor production. These works were to share the load with the older established works at Coventry. Machine tools and processing equipments were still on the "long delivery" basis and a complete change-over was necessarily protracted. However, the first part of the plan was to get a pilot plant installed and working, and to train the workers to produce standard f.h.p. motors. This was accomplished in 1946. The second part of the plan was to lay down three production units to deal with the quantity production of the various classifications of motors. These units were working in 1948, their use being extended in 1949 by shift working. Some indication of the way this factory has expanded is given by the dispatch of its one millionth f.h.p. motor in May last. (The three millionth f.h.p. motor was produced at the Coventry works in 1951.) A fourth production unit has been completed and will add a further 30 per cent to the capacity of the Newcastle-under-Lyme works.



End of the assembly conveyor showing the motors on endurance run at the B.T.H. Newcastle-under-Lyme works



Closing die on laying-up machine for the 110 kV 3-core oil-filled cable which is being made by W. T. Henley's Telegraph Works Co., Ltd., for Belfast Corporation. Reference to this cable contract was made in our last issue

E.W.F. Anniversary Luncheon

On Wednesday next the Electrical Wholesalers' Federation is holding a luncheon at the Dorchester Hotel, London (12.30 for 1 p.m.), to celebrate its fortieth anniversary.

Canadian-Approved Apparatus

In a note under this heading in our issue of 28th May we said that the list of apparatus passed by the B.S.I./C.S.A. Approvals Agency was obtainable from the British Standards Institution for 3s 6d. Actually the list is free; the

price mentioned applies to the booklet, "Information for U.K. Manufacturers Exporting Electrically-operated Equipment to Canada," which describes the approvals system and the service provided by the Agency.

Human Relations in Industry

The Department of Scientific and Industrial Research and the Medical Research Council set up a committee in 1953 to advise on research into human relations in industry. Its first report, "Human Relations in Industry," has just been published by H.M. Stationery Office, price 1s. Included in it are details of research projects that have been approved and are now going ahead.

Merely improving conditions of work has not been the first concern of the committee. The programme of work has been fully discussed with trade unionists and industrialists so that it should be as practical as possible. In every case the committee, under its chairman, Mr. A. B. Waring, managing director of Joseph Lucas, Ltd., has tried to take a broad view of productivity needs, because it believes that greater human satisfaction in work is both compatible with and essential to increased efficiency and productivity.

New Bracknell Works

After nearly thirty years at Kew, Kent Bros. Electric Wire Co. and E. H. Phillips, Ltd., recently moved into their new factory at Broad Lane, Bracknell, Herts. The opening ceremony was performed by Mrs. E. H. Phillips and among the many who attended were Sir Lancelot Keay, K.B.E., chairman of the Bracknell Development Corporation, and the Hon. Peter Remnant, M.P.

The new works occupies an area of 80,000 sq ft and it is anticipated that additional buildings may eventually cover another 40,000 sq ft. The north-light roof construction of the single-storey factory enables the intricate machine work of wire covering, etc., to be carried out under natural daylight conditions and this, coupled with new systems and equipment and more storage space and transport, will help to speed up production and orders. In addition to the factory, all offices are lit by fluorescent lighting (Metrovick). The main electrical contractors were Barlow & Young, Ltd.

Television Equipment for Brazil

A shipment was recently made to Brazil of a complete set of sound and vision equipment for a large television studio. The equipment, which includes four television camera channels, a vision mixer and associated equipment, was consigned by Marconi's Wireless Telegraph Co., Ltd., to Radio Televisao Difusora in Sao Paulo.

Garcke's Manual

The fifty-first edition of "Garcke's Manual of Electricity Supply" is now available from Electrical Press, Ltd., 19–20, Noel Street, London, W.1. The sectional arrangement of the data in this current volume remains practically unchanged from recent issues and includes a general survey of electricity supply in Britain and the constitution, divisional organization and generating stations of the British Electricity Authority, including details of station capacity and operating data. Other sections on electricity distribution and supply and electrical manufacturing and allied companies are also retained, together with a useful directory of executive personnel. The price remains at £3 17s 6d.

Tea Service Equipment

The importance of providing good tea with an efficient service in industrial canteens is emphasized in a booklet entitled "Tea Please," issued by James Stott & Co. (Engineers), Ltd. The booklet gives the rules for good tea-making and then describes in some detail the equipment required for industrial canteens of varying sizes, with tips on the care of equipment. The booklet, which is profusely illustrated, can be obtained (price 2s 6d per copy) on application to "Stotts of Oldham," Vernon Works, Oldham, Lancs.

Interior view of the new works of Kent Bros. at Bracknell

Battery Vehicles in Eire

More than fifty Smith's N.C.B. electric vehicles have been supplied during the last three years to Belands, Ltd., the Dublin bakers. Mr. H. E. O'Donohoe, the chairman and managing director, states that by replacing horse and petrol vehicles it has been possible to effect very substantial economies in the distribution of bread and confectionery to shops in Dublin.

Pig-Feed Mixer

A test report (No. 53/C3) on the Tasker pig feed mincer has been published by the National Institute for Research in Dairying, Shinfield, Reading (price 1s, post free).

Advertisement Correction

We regret that in the advertisement of the Bryce Electric Construction Co., Ltd., in last week's issue (p. 97), the rating of the capacitor bank illustrated was given as 7,000 kVAr; it is actually 7,500 kVAr.

Annual Holidays

The works of Bruce Peebles & Co., Ltd., will be closed for the Edinburgh trades holiday from 2nd to 19th July.

Trade Announcements

The Quasi-Arc Co., Ltd., announces that as from 1st June it is the licensee in Great Britain and the Commonwealth (excluding Canada) for the "Sigma" shielded inert gas metallic arc welding process.

Aerialite, Ltd., together with its associated company, **Nettle Accessories, Ltd.,** has opened a new depot at 198, Blythswood Street, Glasgow (telephone: Glasgow Central 2299).

A new company, **Elesco Electronics, Ltd.,** has been formed to act as the selling organization for Land, Speight & Co., Ltd., Glasgow, for the electronic and electrical equipment (as apart from communication and machinery) which it handles.

The Midlands sales office of the Atlas Lighting Division of **Thorn Electrical Industries, Ltd.,** has moved to 23, Sheepcote Street, Birmingham, 15 (telephone: Birmingham Midland 5291).

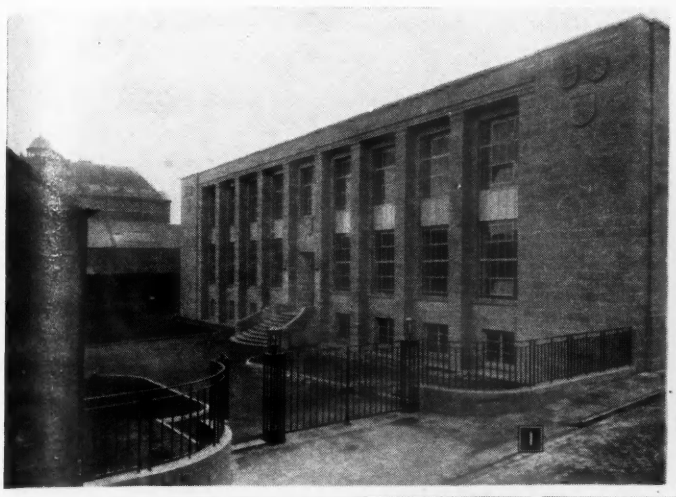
Catalogues and Lists

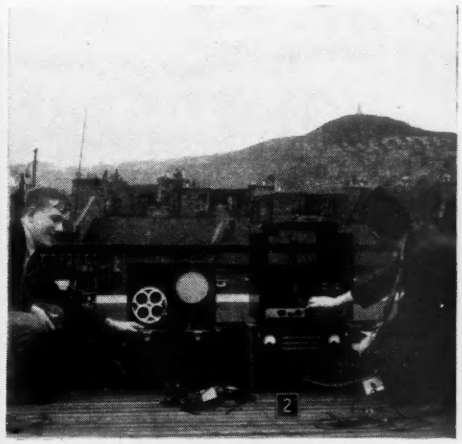
Siemens Electric Lamps & Supplies, Ltd., 38–39, Upper Thames Street, London, E.C.4.—Descriptive folder on a new colour matching unit (1/53).

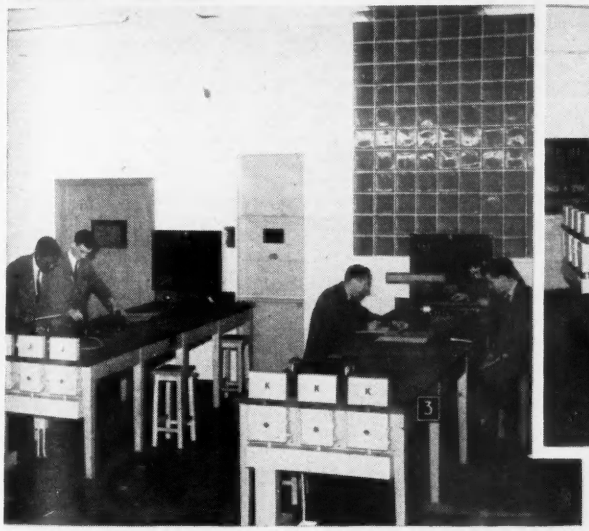
Hotpoint Electric Appliance Co., Ltd., Crown House, Aldwych, W.C.2.—Two descriptive lists covering the ED158 clothes dryer and the H30 4½ cu ft table top refrigerator with the new "Buttador."

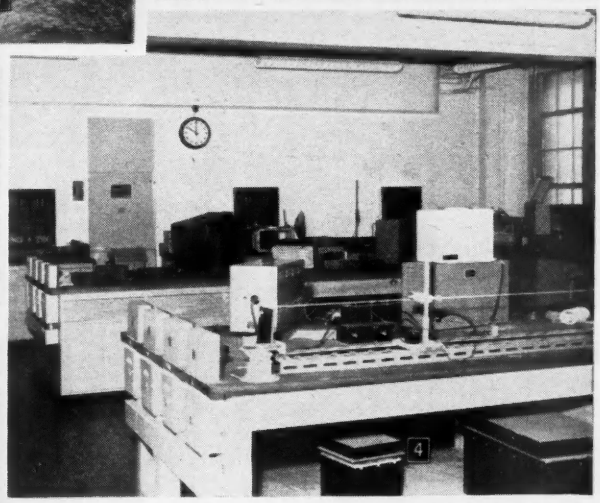
Porter Electrical Products, Ltd., Bramhope, Leeds.—Revised price list including a new range of "Fulgrip" bonding clamps for pipes, conduits, cables, etc.

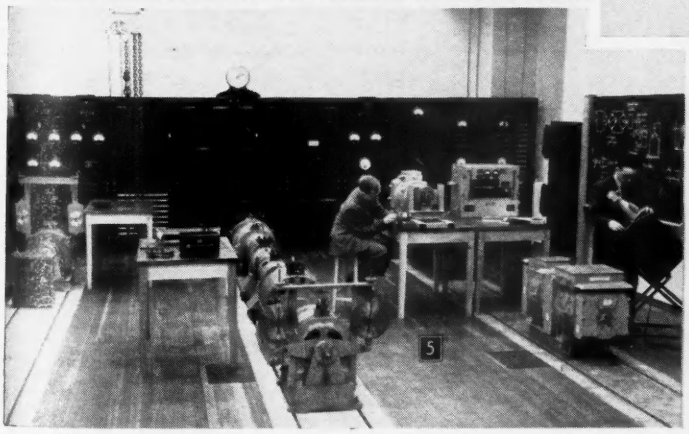
UNIVERSITY COLLEGE, DUNDEE











(1) *Exterior of the Ewing Building.* (2) *Microwave radiotelephony (3 cm) experiments being conducted on the roof of the Ewing Building.* (3) *A junior class at work in the electromagnetics laboratory.* (4) *General view of the electronics laboratory.* (5) *The main distribution board is in the machine laboratory. Here tests are being carried out on metadyne servo-control systems.* (6) *Investigation of noise in waveguides in the screened research room*

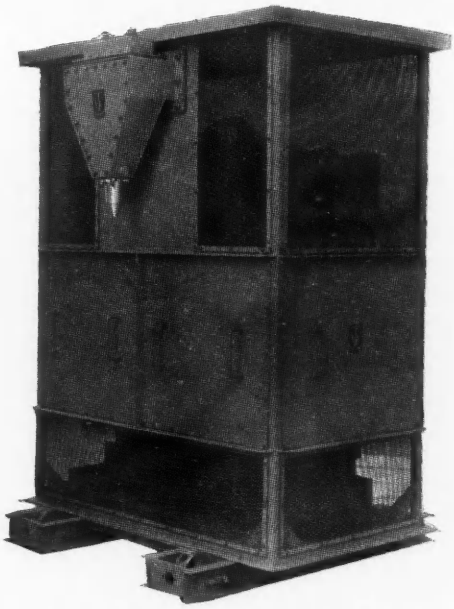
WE are indebted to Prof. E. G. Cullwick, who holds the Watson Watt Chair of Electrical Engineering at the Dundee University College, St. Andrews University, for the above photographs of the new Ewing Building which provides quarters for the Electrical Engineering Department.

Silicone Insulated Transformers

WHEN we visited the works of Transformers (Watford), Ltd., last week, we saw the first of a number of dry type air-cooled transformers to be made in this country with all silicone impregnated insulation using only Class "H" materials. The development and application of these insulants to large commercially produced distribution transformers is new in this country and these 500 kVA three-phase 11 kV/433 V A.N. units occupy less space and weigh less than an O.N. transformer of the same class and complying with the B.E. Specification T.1.

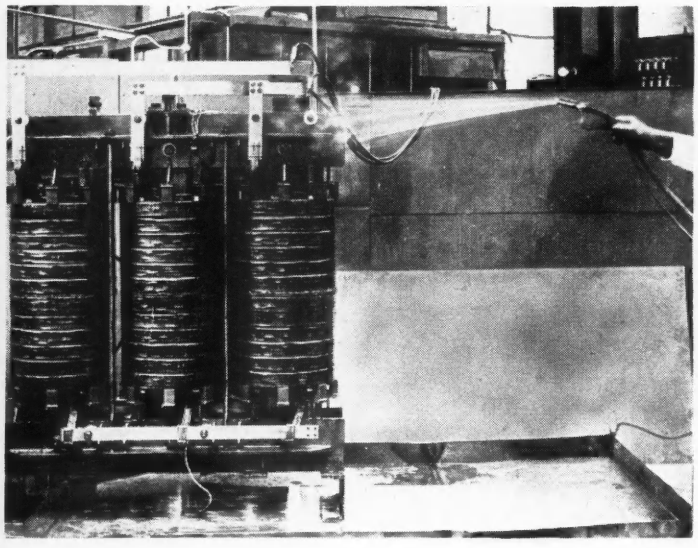
The production of this transformer has only been possible through the rapid development and manufacture of Class "H" insulating materials, and particularly the commercial production of silicone and its compounds. Briefly, silicones are organic compounds of silicon atoms linked with hydrocarbon and oxygen atoms in almost endless combinations. To the electrical engineer the chief characteristics of the silicone products are their water repelling properties, long insulation "life" at high temperatures (200 to 350 deg C), and freedom from fire hazard. Available insulating materials fully meeting the definition of Class "H" are very limited, e.g., porcelain, mica, glass, asbestos, silicone and its compounds. All Class "H" insulation is composed of one or more of the foregoing in various forms, e.g., glass tape, cloth, sheet asbestos, sheet mica and some of the silicone elastomers bonded with the appropriate silicone resin. The production of these transformers has necessitated the installation of high temperature ovens automatically controlled to ensure the long and accurate curing technique essential with silicone impregnated windings or insulation.

Design and construction presented many problems and new winding and assembly techniques had to be developed. The company has always specialized in the design and production of dry type air-cooled transformers to Class "A," or the fire-resisting Class "B" ratings, and is now completing the first contract placed in this country for Class "H" free air-cooled distribution transformers.



A 500 kVA 11 kV T.W. dry type free air-cooled distribution transformer with Class "H" insulation

The core and windings being subjected to a heavy shower of water while at full voltage



Complete and extensive tests have been carried out on the prototype, including the subjection of the core and windings to a heavy shower of water while at full voltage. Thermocouples were incorporated in the cores, the windings and ducts, so that ceiling temperatures and gradients could be accurately determined under true full-load conditions. The data thus obtained have checked the preliminary calculations within very close limits. The temperature rise of these transformers (A.N. or A.B.) and of any capacity can be predetermined to a high degree of accuracy.

When the many advantages of the Class "H" transformer are weighed against the disadvantages and cost of other types, particularly where the use of oil-cooled units is undesirable, its cost even to-day is by no means excessive, and certainly not prohibitive. While the present-day cost of Class "H" insulation is relatively high, it can be reduced by the correct and economical use of silicone materials.

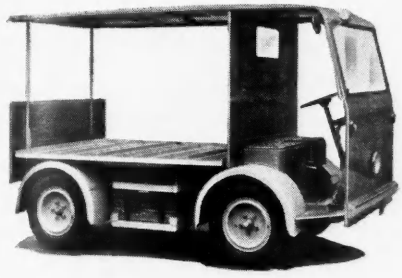
Electronics Exhibition

THE ninth annual electronics exhibition, organized by the North-West Branch of the Institution of Electronics, will be held at the College of Technology, Sackville Street, Manchester, 1, from 14th to 17th July inclusive. The exhibition, which will be opened by Dr. B. V. Bowden, Principal of the Manchester College of Technology, will consist of two sections: a scientific and industrial research section composed of displays from the universities, research associations, hospitals, etc., and a commercial section devoted to manufacturers' products. An extensive programme of lectures will be presented, dealing with topics from all branches of electronics, and will include lectures of general interest as well as those of a highly technical nature. Film shows, on subjects ranging from the "First Principles of Electronics" to the "Manufacture of Radio Valves and Television Picture Tubes," will be presented three times daily. Arrangements have also been made for visitors to see the Manchester University computer in operation.

NEW ELECTRICAL EQUIPMENT

Electric Dairy Vehicle

DESIGNED IN collaboration with and for the dairy trade, the new 25 cwt battery electric vehicle now being made by AUSTIN CROMPTON PARKINSON ELECTRIC VEHICLES, LTD., 95–99, Ladbroke Grove, London, W.11, provides all the advantages of an electric vehicle, when operated under conditions for which it is designed, at a lower initial cost than that of a 25 cwt petrol vehicle.



Morrison-Electricar E.D.25 dairy vehicle

The E.D.25 dairy vehicle has a tubular steel body, welded at joints, and the floor consists of aluminium alloy sections. Aluminium panels are used for the roof and cab. The lead-acid traction type batteries (16 cells) are housed in four blocks between the wheels, the capacity of the standard size being 216 Ah.

The enclosed ventilated and protected series wound motor is easily accessible and designed for heavy duty. Control is by means of a mechanical contactor and speeds are selected by side movement of the operating pedal, giving two speeds forward and reverse. The overall length of the vehicle is 9ft 10in, width 4ft 10in and height 6ft 2½in, with a 5ft 6½in wheelbase.

Passivated Transformer Oil

After four years of research and development work MANCHESTER OIL REFINERY, LTD., Twining Road, Trafford Park, Manchester, 17, has produced passivated transformer oil. This new oil meets B.S. 148 : 1951 and has added to it small amounts, below 0·25 per cent by weight, of organic chemical compounds which render it passive to metals; i.e., it is unaffected by contact with, for example, copper or iron. It also contains an anti-oxidant so its life is extended still further.

Radiators

It is announced by HURSEAL, LTD., 229, Regent Street, London, W.1, that its TV range of radiators has been extended and a thermostat has been incorporated in these models at no extra charge. Separate air thermostats are still recommended for use in permanent installations but thermostats can be incorporated in any of the company's comprehensive range of radiators at an extra charge of £1, including purchase tax.

In addition to the standard colours of bronze and cream, radiators will now be available in eau-de-nil and pastel blue.

Switch Assemblies

A completely new range of one to twelve gang s.p. and one to eight gang d.p. ironclad switch assemblies, in all finishes, is announced by SIMPLEX ELECTRIC CO., LTD., of Broadwell, Oldbury, Birmingham. They are of small dimensions and neat appearance and are designed to meet all industrial requirements.

The cover variations include protected dolly type, surface, flush, B.M.A. chrome, insulated and moulded types. Lundberg 5 and 15 A a.c. switches with brass dollies are used in all units other than those with moulded plates when switches with moulded dollies are incorporated. These switches have a totally enclosed movement, ensuring freedom from dust, moisture, etc., and embody modern principles in slow break switch design.

The boxes are complete with switch supports and accept any of the cover variations. The one and two gang s.p. and one gang d.p. boxes are supplied with pillars and switches in the three to twelve gang s.p. and two to eight gang d.p. boxes are mounted on adjustable grids.

Consumers' Service Unit

The " Newtype " consumers' service unit announced by SIEMENS ELECTRIC LAMPS AND SUPPLIES, LTD., 38–39, Upper Thames Street, London, E.C.4, is available in four-, five- and six-way patterns. Metalclad and insulated types are obtainable. There is ample space and facilities for wiring and knock-outs for conduit entry are provided at the top, bottom and both sides, in addition to back entry. A short-break switch allows for solid copper connections to the fuse-bank busbar, and this also carries a neutral block. The fuses are standard domestic " pull-cap " type for h.r.c. cartridge fuse links to B.S. 1361; spare cartridges are included with each unit.

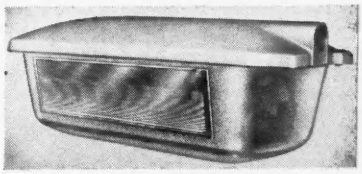
Siemens " Newtype " consumers' service unit

Any combination of fuseways—5, 15, and 30 A—can be supplied. The metalclad type is 7⅛in high, by 6⅞in wide, by 3⅛in deep, and is finished in cream vitreous enamel with a black plastic snap-to cover. The insulated model in black Bakelite is slightly larger.

Street Lighting Lantern

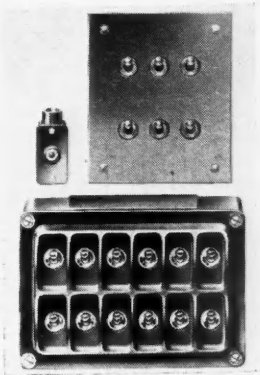
A new streamlined side-entry sodium lantern known as the Mazda " Amber " model has been added to the range of industrial lighting fittings manufactured by the BRITISH THOMSON-HOUSTON CO., LTD., Crown House, Aldwych, London, W.C.2. Designed principally for main road lighting, it can be used with 140 W or 85 W sodium lamps and will house lamp control gear if necessary. This weatherproof lantern is constructed of aluminium alloy and moulded " Perspex," and its smooth finish permits of easy cleaning. All external metal fittings are of stainless steel.

The optical system includes anodized aluminium reflectors and sealed refractor side panels. The price, excluding lamps and gear, is £15 17s.



Above: Mazda " Amber " sodium street lighting lantern

Below: Simplex range of ironclad switch assemblies



Financial Section

STOCKS and SHARES

REACTIONARY tendencies have set in throughout most markets in the Stock Exchange. Gilt-edged stocks remained fairly firm in the belief that official money policy, as exemplified in the latest conversion operation, inclines towards low interest rates. Industrials, however, felt the influence of a bout of Wall Street weakness and of anxiety for the outcome of the Geneva conference. Selling is reported not to have been heavy, however, and it is safe to say that few people apprehend any major or lasting reversal. In the electrical markets, a main talking-point was Sir Alexander Roger's speech at the B.I.C.C. annual meeting, where he dealt with the matter of the Monopolies Commission recommendations. Excellent figures in the Ferranti company's annual profits statement were of limited practical interest to the market, the ordinary capital being privately held.

Cable Conditions

While few of the electric cable manufacturers have had any difficulty this year in maintaining ordinary dividends at least at the previous rates, a certain amount of irregularity has been apparent in the trading results of the group for 1953. At the W. T. Henley's Telegraph recent annual meeting, Sir John Dalton summed up the conditions which created difficulties for the industry during the period. First among them was evidently the tendency for cable buyers, particularly the B.E.A., to live on the large stocks accumulated during the time of scarcity; and, also, to delay new orders in the expectation of a fall in prices after the restoration of freedom in copper dealings. An aggravating factor was the effect, upon the value of stocks in hand, of the fall in the price of the industry's raw materials. The chairman of Henley's remained confident about the long-term outlook, and the tenor of his speech assisted sentiment generally in the market for the shares concerned.

Henley's Reserves

In the difficult circumstances outlined by the chairman of W. T. Henley's Telegraph Works, the fall in the company's trading profit for 1953 was limited to 10 per cent, while with the aid of other income and reduced tax provisions, the net group surplus of £553,000 was more than £150,000 above the previous year's result. This left the 10½ per cent ordinary dividend covered just about twice by the earnings available, and the appropriations raised the combined total of reserves to a figure exceeding £6½ million. Ordinary capital in issue amounts to £4,875,000. The price of the company's 10s shares hardened to 19s after the meeting, which also confirmed earlier news of the contract for the supply of land cables for the Atlantic telephone pro-

Two Weeks' Price Changes

Company or Board	Nom. Value	Middle price 14th June	Two Weeks' Rise or Fall	Dividend Previous	Dividend Last	Yield %	1954 Highest	1954 Lowest
Gilt-edged Stocks						£ s d		
Brit. Elec. 1968/73	100	93½	+½	3	3	3 4 6	93½	88¾
Brit. Elec. 1974/77	100	92	+½	3	3	3 5 3	92	87½
Brit. Elec. 1976/79	100	97	+½	3½	3½	3 12 3	97	93 7/8
Brit. Elec. 1974/79	100	106	+½	4¼	4¼	4 0 2	106	103 1/16
Overseas Electric Supply								
Calcutta Elec.	£1	20/-		6†	6†	6 0 0†	20/7	18/7
East African Power	£1	20/-	−1/6	7	7	7 0 0	23/4	20/-
Nigerian Elec.	£1	24/6	+6d	10	10	8 3 4	25/-	23/6
Palestine Elec. "A"	£1	20/6	+6d	Nil	Nil	Nil	20/6	16/-
Perak Hydro-Elec.	£1	14/3		Nil	6	8 8 6	15/6	13/9
Equipment and Manufacturing								
Aberdare Cables	5/-	9/6	+6d	25	12½*	6 8 3	9/6	8/1
Aerialite	1/-	11/9	−6d	88⅛	88⅛	7 10 3	12/3	10/9
Allen, W. H.	£1	63/9	+6/3	15	20	6 1 0	126/3	50/-
Aron Elec. Ord.	£1	50/-		15	20	8 0 0	50/-	43/-
Assoc. Elec. Ord.	£1	50/-	−1/3	20	11½*	4 10 0	51/3	41/6
Automatic Tel. & El.	£1	73/9xd		15	15	4 1 3	75/-	62/9
Babcock & Wilcox	£1	55/-	−1/3	18	12*	4 7 3	57/-	47/3
Baldwin, H. J.	2/-	4/9		20	20	8 8 5	5/6	3/9
Bakelite	10/-	27/-		12½	12½	4 12 6	27/6	23/6
British Aluminium	£1	34/6	−1/6	12	10	5 16 0	40/-	34/6
B.I. Callender's	£1	41/-	−1/6	10	10	4 17 6	44/-	37/9
B.I. Callender's 6% Pref.	£1	26/-xd		6	6	4 12 3	26/-	24/3
British Thermostat	5/-	28/9		35	27½*	4 15 9	28/9	17/6
British Vac. Cleaner	5/-	13/6		25	25	9 5 2	14/6	11/6
Brook Motors	10/-	40/-	+4/6	20	20*	5 0 0	40/-	33/3
Brush Ord.	5/-	6/-	−9d	4	6	5 0 0	7/-	3/6
Bulgin, A. F.	1/-	3/3		30	30	9 4 6	3/7	3/2
Burco	5/-	14/6		35	35	6 0 8*	14/6	12/1
Chloride El. Storage	£1	62/6		20	12½*	4 0 2	62/6	46/6
Clarke Chapman	£1	55/6		17½	20	—	57/6	47/6
Cole, E. K.	5/-	28/6	−1/3	25	25*	4 7 9	31/-	22/6
Cossor, A. C.	5/-	7/9	−3d	10	10	6 9 0	8/11	7/-
Crabtree	10/-	28/9	−6d	17½	17½	6 1 9	29/6	23/9
Crompton Parkinson Ord.	5/-	18/-xd		11¼	20	5 11 0	18/-	14/-
De La Rue	5/-	13/6	−1/6	35	Nil	Nil	14/10	12/3
Decca	4/-	38/3		150	35*	—	38/3	32/-
Desoutter	5/-	18/9		18	20	5 6 8	18/9	16/1
Dewhurst	2/-	6/-xd		19	19	6 6 9	6/3	5/1
Dictograph Tel.	2/-	6/-		20	20*	6 13 4	6/3	5/2
Dubilier Condenser	1/-	5/6		28	25*	4 11 0	6/-	4/1
E.M.I.	10/-	14/-		12	8	5 14 4	14/9	11/3
Electrical Components	5/-	11/3		20	20	8 17 10	11/6	10/9
Elec. Construction	£1	61/3		15	15	4 18 0	61/3	53/-
Enfield Cable Ord.	£1	20/-		5	Nil	Nil	22/3	16/6
English Electric	£1	45/9		15	10*	4 7 6	45/9	38/-
English Electric 3¾% Pref.	£1	16/6		3¾	3¾	4 11 0	16/6	15/3
Ericsson Tel.	5/-	25/9		22†	25†	2 8 6†*	26/3	22/9
Ever Ready	5/-	23/3		35	40	—	37/-	26/-
Falk Stadelmann	£1	38/9		15	15	7 14 9	41/-	36/6
G.E.C. Ord.	£1	44/6		22½	11¼*	5 1 0	44/6	37/6
G.E.C. 6½% Pref.	£1	27/-		6½	6½	4 16 3	27/3	26/6
General Cables	5/-	16/9		30	30	8 19 2	16/10	16/6
Greenwood & Batley	£1	45/-		15	17½	7 15 6	45/-	40/3
Hackbridge Cable	5/-	14/-	−9d	20	20	6 15 7	15/3	11/3
Hackbridge & Hewittic	5/-	21/3		20	20	4 14 0	21/3	16/10
Hall Tel. Acc.	10/-	10/6	−6d	10	10	9 2 8	11/11	10/6
Heatrae	2/-	4/9		12½	12½	5 5 3	4/9	4/-
Henley's	10/-	19/-	+3d	10½	10½	5 10 6	19/3	15/6
Holophane	5/-	14/9xd		20	20	6 15 7	15/-	13/1

* After capital bonus. † Free of income tax.

The above quotations are based upon middle prices in the Stock Exchange Daily Official List.

ject, and of the important dollar orders secured by the company.

W. H. Allen Results

W. H. Allen £1 shares added 6s 3d to previous substantial improvements after the declaration of the final distributions and the provisional profits statement in respect of 1953. In addition to maintaining the dividend for the year at 15 per cent, the company is distributing 5 per cent by way of bonus. On the total 20 per cent, the shares at the official quotation of 66s 3d now show a yield of £6 1s per cent. (Dealings have in fact been taking place up to 67s 6d.) The shares were an outstanding popular introduction to the market towards the end of 1952, when initial dealings took place at prices not much above 40s. The further expansion of earnings during the latest period covers very comfortably the larger payment, which involves the distribution of £112,400 net from the surplus of £361,000 after tax.

in Electrical Investments

Company or Board	Nom. Value	Middle price 14th June	Two Weeks' Rise or Fall	Dividend Previous	Dividend Last	Yield % £ s d	1954 Highest	1954 Lowest
Equipment and Manufacturing—continued.								
Hoover	5/-	35/9		25	45	6 5 9	36/-	26/3
I.C.I.	£1	65/3	+1/9	13	15	4 12 0	65/3	52/9
Intl. Combustion	5/-	23/-		15	20	4 7 0	23/-	14/6
Johnson & Phillips	£1	48/-	−6d	15	15	6 5 0	52/3	48/-
Lancashire Dynamo	£1	56/3		12½	14	4 19 6	56/3	43/-
Laurence, Scott	5/-	19/3		15	20	5 4 0	19/9	14/-
Lister, R. A.	£1	43/-xd		9	12	5 10 6	43/6	31/9
London Elec. Wire	£1	42/6	−2/6	15	10°	4 14 3	46/3	38/-
Lucas, J.	£1	65/9		9½	10°	3 6 0	65/9	50/3
Marryat & Scott	2/-	7/-		22½	22½	6 8 8	7/-	5/11
Mather & Platt	£1	71/-	+3/-	12½	15	4 4 6	71/-	53/1
Metal Industries	£1	32/3	−1/9	15	12°	7 9 3	42/3	29/6
Midland Elec. Mfg.	£1	67/6		15	15	4 9 0	67/6	63/-
Morphy-Richards	4/-	18/9		40	40	—	18/9	11/4
Murex	£1	55/9		15	15	5 7 6	56/3	50/-
Newman Ind.	2/-	2/3		10	10	8 17 9	2/6	2/-
Oldham & Son	1/-	3/-		35	17½°	5 16 8	3/4	2/5
Parnall (Yate)	5/-	6/3	−6d	6	8	6 8 0	6/9	4/3
Parsons, C. A.	£1	50/-		12½	7½	3 0 0	51/6	38/1
Plessey	10/-	46/3	−1/3	25	30	—	54/-	37/10
Pye Deferred	5/-	22/-	−2/-	18	20	—	24/3	15/7
Revo	10/-	19/6		27½	27½	—	19/6	16/7
Reyrolle	£1	82/6		12½	13¾	3 6 8	83/9	66/-
Rheostatic	4/-	12/6		19	20	6 8 0	12/9	11/-
Richardsons Westgarth	5/-	10/9		12	15	—	11/-	6/6
Scottish Cables	4/-	17/-	−3d	20	27½	6 9 5	17/3	12/11
Siemens Ord.	£1	33/9xd	−3/9	10	10	5 18 6	43/9	33/9
Smith (England), S.	4/-	10/6xd		12½	15	—	11/3	7/8
Southern Areas	£1	18/6		5	6	6 9 9	20/-	17/6
Strand Elec.	5/-	8/9	+6d	17½	17½	10 0 0	9/3	8/3
Sturtevant	5/-	38/9	+6d	18·1†	18·9°†	2 8 9†	38/9	29/-
Sun Elec.	£1	32/6		15	15	9 4 8	32/6	27/6
Switchgear & Cowans	5/-	12/9		22½	10	3 18 6	13/7	9/9
Taylor Tunnicliff	5/-	11/-		25	12½°	5 13 9	12/4	10/7
T.C.C.	10/-	32/6		20	30°	—	31/3	21/3
T.C. & M.	£1	31/-		10	8½°	5 9 8	34/6	30/3
Telephone Mfg.	5/-	8/6xd		10	10	5 17 9	8/6	7/6
Thorn Elec.	5/-	17/6		12½	12½	3 11 5	17/6	13/3
Thornycroft	£1	41/3	+1/3	15	15	7 5 6	41/3	33/4
Tube Investments	£1	66/3		15°	15	4 10 6	68/9	60/3
Vactric	5/-	15/9		Nil	Nil	Nil	17/6	7/6
Veritys	5/-	6/-		10	12½	10 8 3	8/3	5/-
Walsall Conduits	4/-	51/3		70	70°	5 9 3	51/3	44/-
Ward & Goldstone	5/-	52/6	+1/6	45	45°	4 5 9	52/6	41/3
Watford	2/-	6/-		25	22½°	—	6/3	4/7
Westinghouse Brake	£1	67/-		14	15	4 9 6	68/10	60/9
West, Allen	5/-	14/3		15	17½	6 2 10	15/3	12/7
Wolf Electric	5/-	13/3		15	17½	6 12 0	13/10	11/-
Trusts, Transport and Communications								
Anglo-Am. Tel.:								
A Ord.	100	82½		—	6	7 5 6	89½	80
Ord.	100	52½		—	3¾	7 2 10	55½	52
Anglo-Portuguese	£1	24/-	+1/-	8	8	6 13 4	24/-	21/-
Brit. Elec. Traction:								
Def. Ord.	5/-	46/-	+6d	25	35	3 16 1	49/6	39/1
Cable & Wireless:								
Ord.	£1	38/-	−6d	8	9	4 14 9	40/6	26/2
4% Loan	100	98½xd		4	4	4 1 3	98½	95½
Calcutta Trams	£1	18/-	+6d	6†	2½†	—	19/3	17/1
Cape Elec. Trams	£1	15/-		5½	5½	7 6 8	15/3	12/4
Marconi Marine	£1	33/9		10	10	5 18 6	33/9	27/6
Oriental Tel. Ord.	£1	77/-		16	16	—	80/6	73/9
Telephone Props.	£1	4¾		8	8	—	5 1/16	4½
Telephone Rentals	5/-	9/-	−9d	10	10°	—	10/3	9/-

East African Power

Apart from the issue of a million preference shares five years ago, the East African Power & Lighting Company has up to date financed the continuous expansion of the undertaking mainly by issues of ordinary shares; the last of these was made two years ago at a price of 22s 6d per share. With the need for further capital again arising, the company proposes this time to answer the purpose with an issue of £3½ million debenture stock, carrying rights to conversion into ordinary shares. Money is needed, it is stated, to repay a £3 million bank loan, and to meet capital commitments already incurred. Terms of the issue are not yet published, but applications from stockholders are promised preferential consideration.

Ever Ready

Ever Ready ordinary shares are now being dealt in on the basis of the distribution of 2,020,804 ordinary shares of 5s each, credited as fully paid, by way of capitalization of reserves. The old shares are quoted 23s 3d, the new a few pence higher, giving an equivalent of approximately 34s 9d for the old shares. Holders of the latter are allotted one new share for every two old shares held. The new shares can be transferred on letter of allotment, and are free of stamp until 14th July. Certificates of the new shares will be ready at the end of August.

Price Changes

The official quotations on which the accompanying share lists are based show few important changes over the past fortnight among the leaders in the electrical equipment market. This gives perhaps a rather flattering impression of conditions which, as already noted, were distinctly on the easy side by the beginning of this week. In practice, a number of shares, including, for instance, G.E.C., A.E.I., I.C.I., English Electric and Westinghouse, were then changing hands at 1s or so below the list quotations. Movements were, however, by no means all one way. B.E.T. deferred show a net gain of 6d at 46s, after being as high as 49s 6d. Plessey rose to 49s 6d, but reacted to 46s 3d. Improvements were recorded by Thornycroft, Ward & Goldstone, Aberdare Cables, Reyrolle and Mather & Platt.

REPORTS and DIVIDENDS

British Insulated Callender's Cables, Ltd.—Sir Alexander Roger's statement which accompanied the report and accounts for 1953 was summarized in our issue of 28th May.

At the annual meeting held on 10th June Sir Alexander referred to the potential danger to the operation of the industry in the Government's decision to endorse the Monopolies Commission's recommendations. He said that it was true that the Associations (the Cable Makers' Association and the Covered Conductors Association) had been left with the ability to fix minimum prices for certain cables and insulated wires, but the level of those prices was to be no higher than would provide a reasonable profit to the lowest cost producer of each type of cable (there were hundreds of types involved); and costs and profits were to be reviewed from time to time by the appropriate Government Department to ensure that the minimum prices were fixed in accordance with these principles.

The lowest cost producer of the common sizes of some small cables could be one who spent no money whatever on technical research and development, sales marketing, particularly overseas, etc., and this could bear heavily upon those who had been leaders in this industry for many years. Sir Alexander quoted the Commission's tributes to the company for its research and development work.

If similar theories were promulgated in future by the Commission and endorsed by the Government there would be only one outcome—the Government would be fixing the profit rates of substantial sections of British industry and particularly the vital and progressive electrical industry. That would be something new in the annals of British industry, the consequences of which were fraught with the gravest possibilities to all sections of the community.

Sir Alexander expressed disappointment that no reference had been made in the statement of the Minister of Supply to the commendable features of the cable makers' arrangements and achievements which were praised by the Commission, and particularly at this time when the utmost endeavours were directed to improving the competitive position in the export markets. Cables bearing the C.M.A. hall-mark were recognized throughout the world as pre-eminent and the cable makers were disquieted at the potential danger to this great achievement.

They protested strongly at the discrimination against the industry. Many of the customs which had not found approval were recognized and adopted throughout much of British industry, and they believed they were sound and of proved merit. Moreover, those customs were at present subject to general investigation by the Commission and it was their contention that the Government should await the Commission's report before pronouncing against specific sections of industry. In view of the Government's present attitude, there could be no guarantee that effective collaboration within the Associations would continue for those high objectives " continuing research and technical advancement, presentation of quality and furtherance of the important export interests of the industry."

Sir Alexander appealed to the Government to meet the Associations again as he was convinced that with good will on both sides and a frank realization of the vital issues involved a solution equitable to all parties could be found to the good not only of the industry but also to the country in its vital export business.

Heatrae, Ltd., reports a trading profit for the year ended 28th February last of £40,384, as compared with £38,400 for the preceding year, and after meeting all charges, including £12,500 for taxation, the net balance is £10,529 (against £11,464), to which is added £23,769 brought in, making £34,298 available. General reserve receives £5,000, and it is proposed to pay an ordinary dividend of 12½ per cent (unchanged), leaving £25,036 to be carried forward.

In his statement which accompanies the report and accounts, Mr. C. H. Smith (chairman) says that the turnover for the year under review shows a substantial increase over that of the previous year and sales were a record. The rate of gross profit is, however, disappointing and is mainly due to a severe slump in orders for water heaters in the first six months; during this period it was necessary to maintain output of special apparatus which showed a lower gross profit. The falling-off of orders for water heaters was due almost entirely to the continued imposition of purchase tax at a high rate. The benefit of the reduction in the rate of purchase tax did, however, begin to show itself during the last six months of the year and the volume of orders now being received, both for home and overseas, continues to be satisfactory.

The Power Securities Corporation, Ltd.—The annual meeting will be held on 30th June. In his circulated statement Sir Andrew M. MacTaggart (chairman) said that the volume of work of Balfour, Beatty & Co., Ltd., the engineering and construction side of the organization, continued on an increasing level. During the past year Balfour, Beatty was awarded a further contract by the B.E.A. for a major extension to the Staythorpe power station, and this work, together with the completion of the first 300,000 kW installation in that station, was proceeding satisfactorily. Carmarthen Bay power station, which was the other major project in hand for the B.E.A., continued to make good progress. This station was a 345,000 kW installation.

Overseas, a large volume of work was in hand, including work for the East African Power & Lighting Co., Ltd., the Low Tana hydro-electric project, Kenya, and work in Tanganyika, Malaya and Iraq.

The British Thermostat Co., Ltd.—The report and accounts for the year to 31st January last now published confirm the preliminary figures given in our issue of 21st May.

In his statement which accompanies the report and accounts, Mr. J. E. Sherlock (chairman and managing director) says that the results for the year under review are a record for the group. Sales of instruments by all divisions of the parent company show a satisfactory increase. Since its formation it has been supplying control equipment to the refrigeration industry and this continues to represent a substantial proportion of the business despite the competition from foreign-designed instruments. With the object of ensuring higher efficiency, it contemplates forming a new subsidiary company to take over the refrigeration section of the business. The new venture in distributing refrigerator controls direct to the trade has been successful and branches are to be set up throughout the country. The company is now operating in Birmingham and Nottingham, and premises have been acquired in Manchester.

After reviewing the activities of the other companies of the group, Teddington Controls, Ltd., Teddington Industrial Equipment, Ltd., Societe Francaise des Thermostats, S.A., the Packless Gland Co., Ltd., and P. W. Baker & Sons, Ltd., the chairman says that as most of the products of the group are sold direct to manufacturers it is difficult to present a factual report on the true value of exports. It is intended to employ part of this year's profit to finance a campaign which will have as its object the expansion of direct export sales.

The Telephone Manufacturing Co., Ltd.—The report and accounts for 1953 show a consolidated trading profit of £360,399, as compared with £249,187 for 1952, and after meeting all charges, including £155,183 for taxation, the net profit is £148,694 (against £50,387), of which £142,962 is attributable to the parent company. General reserve receives £100,000, and it is proposed to pay a final dividend of 7½ per cent, making 10 per cent for the year. The balance carried forward is £196,765 (against £188,661 brought in).

In his accompanying statement, Mr. F. T. Jackson (chairman and managing director) says that sales have continued at a high level, and 20 per cent of the turnover was exported. Work in hand will keep them busy for the remainder of the current year, but prices are much keener and they are finding new business more difficult to secure. The Capacitor Department has been fully occupied the whole year. Orders for line transmission have been favourable and the capacity of the Cray factory is filled for some time to come. The Marine Department has a full order book and practically the whole of the equipment made by this section is installed on board ships of the Royal Navy and leading liners in the mercantile marine at home and abroad.

The Calcutta Electric Supply Corporation, Ltd.—The main figures in the accounts for 1953 were given in our 4th June issue.

In his circulated statement, Sir James Donald (chairman) says that the year under review was one of normal development, consolidation and expansion. Sales of electricity passed the 1,000 million kWh mark, the increase over 1952 being 50 million kWh. The growth of demand was somewhat lower than that of recent years and it would seem that they have returned to more normal conditions. A new source of demand is likely to eventuate in the near future, viz., railway electrification. Plans for the electrification of the railways running into and out of Calcutta, as well as in Calcutta and other parts of its area, are now in the preparatory stage, and in these the company will take its full share.

The ordinary domestic and residential sales at the flat rate increased from 158·9 million kWh in 1952 to 166·5 million in 1953, while supplies for electrical apparatus, air-conditioning and refrigeration showed an encouraging increase. Engin-

(*Continued overleaf*)

eering workshops and chemical works account for the bulk of the increase in industrial h.v. power, under which 641·2 million kWh was sold, as against 610·8 million in 1952.

Referring to the agreement under which the Damodar Valley Corporation will supply electricity to augment the Calcutta Electric Supply Corporation's own supply, the chairman says that the demand in the first instance will be 45,000 kW. The supply generated at the Bokaro power station and the associated hydro-electric stations of the Damodar Valley Corporation will be transmitted by 132 kV overhead lines to a substation in the neighbourhood of the Botanical Gardens in Howrah, where it will be transformed to 33 kV for connection to the Calcutta system. This scheme will defer for some years the necessity for the erection of a new Southern generating station.

Ferranti, Ltd.—Preliminary figures show a group net profit for the nine months to 31st March last of £546,863, as compared with £436,248 for the preceding twelve months, after providing £873,000 for taxation. A provision of £102,083 is made for premium on redemption of redeemable preference shares and £330,765 is placed to general reserve. It is proposed to pay an ordinary dividend for the period of 6 per cent (same for twelve months), and to carry forward £345,813 (against £314,750 brought in).

The East African Power & Lighting Co., Ltd., is to make an issue of £3,500,000 debenture stock carrying conversion rights into ordinary shares. The proceeds will be used to repay a bank loan of £3,000,000 and to meet capital commitments already incurred. Details are to be announced as soon as possible, but it is intended to give stockholders preferential treatment. A meeting will be held on 9th July in Nairobi to create capital to meet the conversion rights.

Major C. H. Taylor, the chairman, states that, subject to final Governmental approval, arrangements have now been made to take bulk power from Uganda. It is expected that a supply of up to 43,500 kW will begin in 1957.

Aron Electricity Meter, Ltd., proposes to pay a dividend for the year of 15 per cent. For the previous year a similar payment was made plus a bonus of 5 per cent.

New Companies

Electronic Switchgear (London), Ltd.—Registered 3rd June. Capital £7,000. Designers and manufacturers of and dealers in electro-mechanical and radioactive recording, controlling and communication devices adaptable to agricultural, industrial, mechanical, medical, chemical and electrical purposes, etc. Directors: G. H. Symonds, B. R. Symonds and R. A. Sproule. R. H. Symonds, Ltd., Symonds Engineering Co., Ltd., Symonds & Sons, Ltd., Symonds (Distributors), Ltd., Beryllium & Copper Alloys, Ltd., and Symonds Investments & Deposits, Ltd., acting as one body, may appoint directors. Regd. office: 47, Victoria Street, S.W.1.

Radio & Allied Industries, Ltd.—Registered 8th June. Capital £150,000. Manufacturers of, agents for and dealers in radio receivers and transmitters, television receiving sets and transmitters and electrical apparatus and appliances, gramophones and records, etc. Regd. office: Langley Park, Slough, Bucks.

W. H. Shoebridge & Sons, Ltd.—Registered 9th April. Capital £4,000. Manufacturers of and dealers in electrical plant, machinery, equipment, generators, alternators, dynamos, motors, armatures, magnetos, etc. Directors: W. H. Shoebridge, Mrs. Marjorie I. Shoebridge (secretary), W. R. E. Shoebridge and E. M. Shoebridge. Regd. office: 56, Upper Mounts, Northampton.

Northern Fluorescent Co., Ltd.—Registered 12th May. Capital £100. Manufacturers of and dealers in electrical, fluorescent and tungsten lamps, fittings and equipment, quartz and vapour lamps, etc. The first directors are not named. Solicitors: W. T. Jones, 18, John Street, W.C.1.

Elston Electric (Brecon), Ltd.—Registered 9th April. Capital £1,000. Electrical and gas engineers, etc. Directors: H. P. Elston and H. E. B. Elston. Solicitors: Tree, Hemming & Johnston, Worcester.

Increases of Capital

Bailey Meters & Controls, Ltd.—Increased by £100,000, in £1 ordinary shares, beyond the registered capital of £100,000. At 20th February, 1953, Babcock & Wilcox, Ltd., held 42,895 shares and International Combustion (Holdings), Ltd., held 14,299 shares out of 57,200 shares issued.

Holdsworth Electric, Ltd.—Increased by £11,500, in 8,000 ordinary and 3,500 7½ per cent redeemable cumulative preference shares of £1, beyond the registered capital of £500.

Liquidations

Midelect Co., Ltd., electrical wholesalers.—Winding up voluntarily. Liquidator, Mr. T. Wilford Pell, 187, Wollaton Street, Nottingham, appointed 20th May.

Midland Wireless and Electrical Appliance Co., Ltd.—Meetings, pursuant to Section 299 of the Companies Act, 1948, at the offices of Leeds Barlow & Co., 66, Alma Street, Luton, to receive an account of the winding up by the liquidator, Mr H. L. Barlow.

Bankruptcies

J. C. R. Gillitt, carrying on business as C. Gillitt & Son, at 19, Stangrove Road, Edenbridge, and formerly at 9, Stangrove Road, Edenbridge, Kent, electrical contractor.—Trustee, Mr. R. B. M. Knight, 56a, East Street, Brighton, appointed 1st June.

R. V. Mayner, 62, Harris Street, Peterborough, Northants, electrical engineer, lately carrying on business at Narrow Street and Wentworth Street, Peterborough. — Further supplemental dividend of 10½d in the £ (making 20s in all) and 4 per cent statutory interest, payable on and after 21st June at the Official Receiver's office, 41, Sidney Street, Cambridge.

J. G. Elvidge, 31, Wincheap, Canterbury, electrical contractor.—Trustee, Mr. E. C. Williams, Midland Bank Chambers, Herne Bay, released 7th April.

H. W. Daldry, 57, Lower Cliff Road, and lately carrying on business at 168, Bells Road, both at Gorleston-on-Sea, Suffolk, electrician.—Last day for receiving proofs for dividend 23rd June. Trustee, Mr. F. R. D. Walter, Castle Chambers, Opie Street, Norwich, Official Receiver.

STREET LIGHTING NOTES

"Mazda" sodium street lighting has recently been installed in the High Street and Market Place at Leighton Buzzard, Bedfordshire. Enclosed lanterns with sealed refractors, housing 140 W lamps, are mounted on Concrete Utilities columns. The scheme replaces an installation of "Mazda" open sodium lanterns installed in 1942. Existing columns have been used with the addition of a number of extra points where the spacing between columns was too great. Roads with a width of over 60ft are usually lighted by centrally mounted lanterns but in this case an extremely high level of illumination has been achieved by the side-entry method. The installation was planned by the Council's engineer and surveyor, Mr. S. W. Pacey.

BOSTON R.D.C. is to provide a further 86 street lamps during the financial year to complete the lighting of existing housing estates.

DEAL Town Council has decided to convert 142 lamps from gas to electricity at a cost of £5,970.

BELFAST Rural Council has approved a new lighting scheme for the whole district. A start on the work will be made this summer.

KESWICK U.D.C. has received sanction to borrow £6,750 for improvements to the street lighting system.

BOLTON Lighting Committee proposes to apply for sanction to borrow £8,280 for improved lighting of various main roads and bus routes in the borough.

ECCLES Highways & Town Planning Committee is applying for consent to borrow £7,000 for improved lighting in Parrin Lane, Monton Green, Monton Road and Half Edge Lane.

STRETFORD Corporation is making application for sanction to borrow £9,528, for improved lighting in various streets.

DARLINGTON Town Council has received loan sanction for £9,600 for improving the lighting of the Great North Road.

BRADFORD City Council is recommended to approve schemes for the provision of electric street lighting on the Seed Farm section of the Halifax Road estate at an estimated cost of £2,766, and the improvement of street lighting in Westgate Hill (£3,498).

CHISLEHURST and SIDCUP U.D.C. is to seek authority to proceed with a scheme for the provision of improved lighting for the entire length of Blackfen Road from County Gate to Hamilton Road, Sidcup, and in Cray Road, Foots Cray. The estimated cost is £11,292.

Seaside Illuminations

New Brighton (Wallasey) illuminations in Vale Park were officially opened by the Mayor on 4th June. One of the features is the "Tree Walk." This is 15ft high and enables visitors to enjoy the novelty of walking within touching distance of the branches in the foliage of which are perched hundreds of illuminated birds. A special recording of the birds' "dawn chorus" is relayed by means of hidden loudspeakers. There are numerous set-pieces. The most expensive single exhibit is the "Teddy Bears' Roundabout," which cost £500.

NEW PATENTS

Electrical Specifications Recently Published

The numbers under which the specifications will be printed and abridged are given in parentheses. Copies of any specification (2s 8d each including postage) will be obtainable after 28th July from the Patent Office, 25, Southampton Buildings, London, W.C.2.

1949

115. Elliott Bros. (London), Ltd.—Electrical voltage or potential reproducing apparatus. 3rd January, 1950. (712602.) 26257. Timing wave generator circuits. 12th October, 1950. (712743.)

27944. National Research Development Corporation.—Electron discharge devices combined with waveguides. 31st October, 1950. Cognate applications 8102, 31st March, 1950, and 8522, 5th April, 1950. (712474.)

1950

29754. British Thomson-Houston Co., Ltd. —Automatic electric circuit breakers. 5th December, 1950. (712482.)

1951

5329. Garnon, G. E., and Fleury, R. F. L.—Measuring apparatus using electrical oscillations. 5th March, 1951. (712527.)

6049. General Electric Co., Ltd.—Starting resistances for electrically propelled vehicles. 18th February, 1952. (712693.)

11071. General Electric Co., Ltd., and Beggs, S. S.—Lighting fittings. 9th May, 1952. (712625.)

12423. Monsanto Chemicals, Ltd.—Production of silicones. 28th May, 1951. (712697.)

12599. General Electric Co., Ltd., and Collins, L.—Picture telegraph receivers. 29th August, 1952. (712626.)

15473. Strong Electric Corporation (Great Britain), Ltd., and Aldrich, E. C.—Sconces for electric lamps. 14th July, 1952. (712630.)

16660. Standard Telephones & Cables, Ltd. —Coupling arrangements for electromagnetic waveguides. (712631.)

19487. General Electric Co., Ltd., and Foot, J. B. L.—Panoramic radio receivers. 18th August, 1952. (712763.)

20769. General Electric Co., Ltd., and Sanderson, R. W. W.—Methods of securing metal articles to thermoplastic materials. 25th August, 1952. (712494.)

23033. Henley's Telegraph Works Co., Ltd., W. T., and Wheeler, H. S.—Electrical fuse holders. 11th September, 1952. (712532.)

23526. Adler, A. E.—Intercommunication telephone systems. 9th January, 1953. (712497.)

24799. Electric & Musical Industries, Ltd.— Magnetic transducing apparatus. 20th October, 1952. (712536.)

25040. Kodak, Ltd.—Electro-optical reproduction. 26th October, 1951. (712499.)

29556. General Electric Co., Ltd., Barston, G. W., and Foot, J. B. L.—Electric oscillators of the crystal-controlled type. 21st November, 1952. (712773.)

29858. Standard Telephones & Cables, Ltd. —Electrical gas discharge tube circuits. 20th December, 1951. (712643.)

1952

87. Glover & Co., Ltd., W. T.—Joints for electric conductors. 31st December, 1952. (712774.)

1522. Thornton, A. A. (Micafil Akt.-Ges.). —Process for producing laminated oil-proof electric insulating material. 18th January, 1952. (712645.)

2130. Philips Electrical Industries, Ltd.— Electric circuit arrangements. 17th November, 1952. (712709.)

4223. Standard Telephones & Cables, Ltd. —Units for suppression of electrical interference. 18th February, 1952. (712650.)

5560. British Insulated Callender's Cables, Ltd.—Insulated electric cables and impregnating compounds therefor. 2nd March, 1953. (712781.)

7384. General Electric Co., Ltd., Ledger, R., and Turrall, J. C.—Electric motor control systems. 22nd December, 1952. (712711.)

9185. Licentia Patent-Verwaltungs-Ges.— Electric gas-blast circuit breakers. 10th April, 1952. (712785.)

9283. Uher, E.—Electromagnetic switch relay, more especially combined current regulator, voltage regulator and charging switch for lighting installations of power-driven vehicles. 10th April, 1952. (712660.)

9579. Marconi's Wireless Telegraph Co., Ltd.—Automatic protection and alarm circuit arrangements for radio and like transmitters. 18th December, 1952. (712552.)

10377. English Electric Valve Co., Ltd.— Target structures for cathode-ray tubes. 23rd January, 1953. (712713.)

13041. Busch-Jaeger Lüderscheider Metallwerke Akt.-Ges.—Cam-operated electric switches. 22nd May, 1952. (712791.)

13296. Perlman, T.—Magnetic separators. 26th May, 1952. (712663.)

14747. Time, Inc.—Electronic masking method and apparatus for electrical colour reproduction systems. 11th June, 1952. (712558.)

15153. Siemens & Halske Akt.-Ges.— Electric condensers. 16th June, 1952. (712559.)

15557. Electric Storage Battery Co.—Plates of electric storage batteries. 20th June, 1952. (712561.)

15721. Allmanna Svenska Elektriska Aktiebolaget.—Method and apparatus for thoroughly electrically heating large billets. 23rd June, 1952. (712562.)

16017. Dubilier, W.—Manufacture of electrical capacitors. 25th June, 1952. (712667.)

17079. Compagnie Générale de Télégraphie sans Fil.—Travelling wave magnetron tubes. 7th July, 1952. (712565.)

17578. Chloride Electrical Storage Co., Ltd. —Lead acid electric accumulators. 27th April, 1953. (712798.)

19066. Siemens-Schuckertwerke Akt.-Ges. —Slot wedges for electric machines. 28th July, 1952. (712802.)

20592. Mallory & Co., Inc., P. R.—Ultra-high-frequency variable inductance tuning devices. 15th August, 1952. (712730.)

21543. Standard Telephones & Cables, Ltd. —Electrical circuit for giving an indication of the condition of one or more storage circuits. 27th August, 1952. Addition to 636700. (712671.)

23209. Standard Telephones & Cables, Ltd. —Electrical interference suppressor units. 16th September, 1952. Addition to 712650. (712673.)

24883. Titan Co., Inc.—Method for the electrolytic production of titanium metal. 3rd October, 1952. (712742.)

25311. Research Corporation.—Electrostatic precipitators. 9th October, 1952. (712581.)

25577. General Electric Co.—Electric transformers. 13th October, 1952. (712583.)

25733. Philips Electrical Industries, Ltd.— Automatic frequency stabilization of electric oscillators. 14th October, 1952. (712584.)

31425. Radio Corporation of America.— Colour television receiver synchronizing apparatus. 11th December, 1952. (712738.) 31426. —Electro-optical apparatus for reproducing multi-coloured originals. 11th December, 1952. (712594.)

31537. Western Electric Co., Inc.—Inductance devices. 12th December, 1952. (712808.)

Amended Specification

696495. Midland Electric Manufacturing Co., Ltd.—Combined electric switches and fuse holders.

TRADE MARKS

APPLICATIONS have been made for the registration of the following trade marks. Objections may be entered up to 2nd July:—

KLOPP (design). No. 722,312, Class 7. Machine tools, electric motors and hydraulic motors (none being for land vehicles), hydraulic pumps, etc.—Klopp-Werke G.m.b.H., Germany. Address for service, c/o Pollak, Mercer & Tench, 134, Cheapside, London, E.C.2.

HYDROCAP. No. B710,549, Class 9. Electric storage batteries; and battery caps employing a catalyst for use in maintaining the water level in electric batteries.—Industrial Research, Inc., U.S.A. Address for service, c/o Stevens, Langner, Parry & Rollinson, 5–9, Quality Court, Chancery Lane, London, W.C.2.

LINDE. No. B715,442, Class 9. Electric arc welding apparatus and parts, etc.—Union Carbide & Carbon Corporation, New York, U.S.A. Address for service, c/o Marks & Clerk, 57 and 58, Lincoln's Inn Fields, London, W.C.2.

PRIMAXA. No. 722,117, Class 9. Electrically heated implements capable of functioning as soldering irons and as cutting irons.—E. Engel and F. Engel, Wiesbaden, Germany. Address for service, c/o Jenkins & Perkins, 1, Quality Court, Chancery Lane, London, W.C.2.

SARO. No. 723,488, Class 9. Electrical and electronic apparatus and instruments, all included in Class 9, radio apparatus, radio location apparatus, and parts.—Saunders-Roe, Ltd., Osborne, East Cowes, I. of W.

ELECTROFACT (design). No. 726,730, Class 9. Electrical instruments and parts.—Electrofact, Ltd., Winchester House, Old Broad Street, London, E.C.2.

CIBIE (design). No. B724,680, Class 9. Electrical and optical apparatus for varying the beam and light intensity of lamps on vehicles; apparatus for testing the adjustment of optical projectors and the lighting equipment on vehicles; and voltage regulators, cut-outs, connections, contact devices, switches and terminals for use with lighting installations on vehicles.—Pierre Cibié, Paris, France. Address for service, c/o Pollak, Mercer & Tench, 134, Cheapside, London, E.C.2.

LINCOLNAC. No. 728,918, Class 9. Electrical apparatus and parts.—J. A. Crabtree & Co., Ltd., Lincoln Works, Lincoln Road, Walsall, Staffs.

AMPLI-BOND. No. 728,998, Class 9. Electrical connectors.—Aircraft-Marine Products, Inc., Harrisburg, Pennsylvania, U.S.A. Address for service, c/o Stevens, Langner, Parry & Rollinson, 5–9, Quality Court, Chancery Lane, London, W.C.2.

FLIPPO. No. 728,848, Class 11. Flashlamps and parts.—Bantam-Lite, Inc., U.S.A. Address for service, c/o George Fuery & Co., Newhall Chambers, 8, Newhall Street, Birmingham, 3.

GENERATION AND DEVELOPMENT

Two New Power Stations

THE British Electricity Authority has received the consent of the Minister of Fuel and Power to the establishment of two new power stations, one at Erith, Kent (to be known as the Belvedere station) and the other at Elland, Yorks. The Belvedere station will have an installed capacity of 480,000 kW made up of eight 60,000 kW turbo-generators, and the Elland station a capacity of 180,000 kW provided by three 60,000 kW turbo-generators. In both stations each turbo-generator will be served by a boiler unit having an evaporative capacity of 550,000 lb/hr. The Elland station consent also covers two cooling towers each having a capacity of 3,000,000 gal of water an hour.

Progress in Ulster

During the first four months of this year nearly 600 farms were connected to the power supply of the Northern Ireland Electricity Board, bringing the total up to 8,564, states the 1953 report of the Board. Farms connected numbered 1,448 as compared with 1,328 in the previous twelve months. During the year the Board spent £612,460 on rural development (against £360,222). New consumers connected numbered 8,746, of whom 4,975 were rural and 3,771 urban. The total number of consumers at the end of 1953 was 126,235, of whom 50,128 were rural. During the past four years urban consumers have increased by 13,374, rural consumers by 20,275 and farms by 5,104. Last year 240 miles of h.v. lines and 208 miles of l.v. mains and distributors were constructed, making a total of 2,871 miles of h.v. and 1,928 miles of l.v. lines. Income amounted to £2,542,379, an increase of £253,259, and expenditure at £2,541,589 showed a rise of £253,479.

Domestic Tariff Assessments

Inquiries carried out by the North Western Electricity Board throughout its area have produced no evidence to support the view that the bills of a large number of homes have been incorrectly calculated. Mr. A. O. Johnson, chief commercial officer of the Board, told the Electricity Consultative Council at its meeting in Manchester that he was satisfied that the position at Burnage Garden Village, Manchester—where 34 out of 66 houses were found to be under-assessed—was not typical of the area as a whole. Opposing a suggestion that the Board should undertake a comprehensive check on domestic assessments, Mr. Johnson said that this would expose the Board to charges of bureaucracy. It would also mean taking on extra staff. When the Electricity Board standardized its domestic tariff it made its assessments on the basis of returns by consumers on the number of "assessable" rooms. In some cases, it appears, consumers were confused about the inclusion of "sculleries" containing cookers.

Transmission Line Diversion

The Ministry of Housing and Local Government has approved the Felling-on-Tyne Council's recommendations for the resiting of the Dunston-Carville 66 kV feeders where they cross the Leam Lane housing estate, Felling. The Council is seeking permission to borrow £15,870 to cover the estimated cost of diverting the lines.

275kV Transformer for Carrington

The first 120,000 kVA auto-transformer for the British Electricity Authority's 275 kV supergrid substation at Carrington was last week dispatched from the Trafford Park Works of the Metropolitan-Vickers Electrical Co., Ltd. The heaviest piece for transport was the tank containing the core and windings: this weighs 135 tons. It was shipped filled with a dry gas under pressure to avoid carrying oil, which would increase the weight. The tank is 25ft 9in long, 14ft 10in wide and 12ft high. When fully assembled on site this transformer will cover an area of over 1,000 sq ft. It will weigh 278 tons and contain more than 25,000 gallons of oil.

The 120,000 kVA auto-transformer for the 275 kV substation at Carrington being prepared for transport in the transformer department at Trafford Park

Improved Consumer Service

A radio-controlled emergency service for dealing with faults on consumers' premises has been put into operation in the No. 3 Sub-Area of the North Western Electricity Board. Emergency service is now available at all hours of the night and day instead of from 7 a.m. to 10.30 p.m. Previously the consumer service for dealing with faults was organized on a district basis and centred on depots operating at Oldham, Rochdale and Stalybridge.

Cooker Maintenance

The cost of repairs to electric cookers installed in its houses is causing concern to Lowestoft Town Council. Faced with a bill for £437 for repairs to 379 cookers in the six months ended March this year, the Council is calling for monthly reports in future. The main cause of the trouble, it is stated, is the wrong use of the cookers. Demonstrators who visited some 400 houses found that in no less than 328 wrong utensils were being used. Most of the repairs have had to be carried out to hot-plates. In 293 cases there was no electric kettle available.

Second Port Augusta Station

Some of the largest items of equipment for the proposed second regional power station at Port Augusta may be erected outdoors, following a trend common to-day in the United States. Mr. C. F. Paul, of Preece, Cardew and Rider, the South Australian Electricity Trust's English consultants, recently visited Adelaide to discuss this and other matters, and he inspected the site of this second station which, it is proposed, will be built on an artificial island adjoining the station which is about to start operating.

Electricity in Border Area

On 30th June Sir Henry Self, deputy chairman of the British Electricity Authority, is to meet a deputation from the South East Scotland Electricity Consultative Council to discuss the general question of rural development in the Border area and particularly a request for a special capital allocation for North Northumberland. The Council approached the B.E.A. because it appeared that the rural areas supplied by the S.E. Scotland Board in North Northumberland were not likely to receive a supply for a number of years whereas the North Eastern Electricity Board was able to supply outlying farms within twelve months.

Railway's 150th Anniversary

This month the Swansea and Mumbles Railway, which originally joined Swansea and Oystermouth and was later extended to Mumbles Pier, celebrates the 150th anniversary of its incorporation. It was opened for traffic in April, 1806.

At the start, motive power was provided by horses and these continued to be used for both freight and passenger traffic until 1885. Steam locomotives were then introduced and continued in use until 1929 when electric tramcars were put into service. The British Thomson-Houston Co., Ltd., supplied electrical equipment for the eleven double-deck cars each seating 106 passengers and, as far as is known, these are the largest tramway-type cars ever built. Two years later, two more similar cars were added. The cars are of the bogie type each fitted with two 50 h.p. motors. They are suitable for multiple-unit working.

CONTRACT INFORMATION

Accepted Tenders and Prospective Electrical Work

CONTRACTS OPEN

Where "Contracts Open" are advertised in our "Official Notices" section the date of the issue is given in parentheses.

Australia. — MELBOURNE. — 23rd June. State Electricity Commission of Victoria. Disconnecting switches. (E.S.B. 14271/54. Ten/9519.)* 11th August. 220 kV transformers and spares. (E.S.B. 14261/54. Ten/9549.)*

ADELAIDE.—30th September. Electricity Trust of South Australia. Four or five 360,000 lb/hr steam generating units. (See this issue.)

PERTH.—28th July. Western Australian Government Tender Board. Circulating water pumping and control equipment. (E.S.B. 14527/54. Ten/9558.)*

Ayr.—County Council. Four separate schedules in connection with trunk road lighting will be issued shortly. (See this issue.)

Bath.—23rd June. Electrical installations in 16 traditional type houses at Foxhill estate; architect, 7, North Parade Buildings.

Formosa. — TAIPEI. — 3rd July. Taiwan Power Co. Watthour meters. (E.S.B. 14553/54. Ten/9562.)*

2nd July. Various electrical equipment. (E.S.B. 14620/54. Ten/9565.)*

India.—TRIVANDRUM.—30th June. Stores Purchase Committee, Government of Travancore-Cochin. Lightning arrestors. (E.S.B. 14313/54. Ten/9532.)* 21st July. 11 kV insulators and fittings. (E.S.B. 14315/54. Ten/9535.)* 24th July. Cut-outs, fuse units and link boxes. (E.S.B. 14314/54. Ten/9531.)* 28th July. Insulators and fittings. (E.S.B. 14316/54. Ten/9538.)*

DELHI.—24th June. Directorate General of Supplies and Disposals. Electro heat treatment furnace. (E.S.B. 14273/54. Ten/9517.)* 1st July. Centrifugal pumping sets. (E.S.B. 14272/54. Ten/9520.)* 8th July. Electrically heated hardening furnaces. (E.S.B. 14265/54. Ten/9521.)*

King's Lynn.—19th July. Town Council. Electrically driven vertical spindle borehole type pumps, etc. John Taylor & Sons, Artillery House, Artillery Row, Victoria Street, London, S.W.1.

Kuwait.—31st July. Government of Kuwait. Twenty-five 100 kVr 415 V capacitors. (See this issue.)

Maidstone.—12th July. Corporation. Rewiring and re-lighting the Corn Exchange. (See this issue.)

Manchester.—30th June. Welfare Services Committee. Passenger lift for Park Hall, Victoria Park. City architect, Town Hall.

Newcastle-on-Tyne.—14th July. City Council. Electrical installations in 216 houses on the Fawdon estate. City architect, 18, Cloth Market.

New Zealand. — WELLINGTON. — 20th July. Post and Telegraph Department. Voltage and phase protective relays. (E.S.B. 14455/54. Ten/9554.)* 21st July. Telephone cable. (E.S.B. 14456/54. Ten/9555.)*

Persia.—TEHRAN.—3rd July. Procurement Office USOM/1. One electric-powered humid air dry kiln. (E.S.B. 14458/54. Ten/9557.)* 6th July. Two 100 h.p. diesel engines, two 62 kW generators, switchboards and accessories. (E.S.B. 14356/54. Ten/9552.)*

South Africa. — PRETORIA. — 1st July. Union Tender and Supplies Board. Radio valve testers. (E.S.B. 14289/54. Ten/9522.)*

JOHANNESBURG.—1st July. Stores Department, South African Railways. Electric cable. (E.S.B. 14192/54. Ten/9502.)* 8th July. Track circuit breakers. (E.S.B. 14689/54. Ten/9570.)* 660 V cables (E.S.B. 14666/54. Ten/9569.)* Switchgear and transformer. (E.S.B. 14664/54. Ten/9574.)*

Spain.—MADRID.—7th July. Ministry of the Interior. Twenty miles of submarine cable. (E.S.B. 14262/54. Ten/9550.)*

Sunderland.—21st June. Corporation. Electrical installations in 33 houses at Fulwell. Borough engineer, 27, Fawcett Street.

United States.—SEATTLE.—7th July. Seattle Board of Public Works. 100,000 kVA generator for Ross power plant. (E.S.B. 14357/54. Ten/9561.)*

Uruguay. — MONTEVIDEO. — 23rd July. Usinas Electricas y los Telefonos del Estado. Armoured cables and accessories. (E.S.B. 14340/54. Ten/9547.)*

West Hartlepool.—23rd June. Corporation. Electrical installations in shops, maisonnettes and houses being built on the Owton Manor Estate. Borough architect, Municipal Buildings.

Worcester.—24th June. City Council. Renewal of electrical installation at the Guildhall. City engineer, 22, Bridge Street.

York.—26th July. Leeds Regional Hospital Board. Electrical installations in new operating theatre at the County Hospital. (See this issue.)

ORDERS PLACED

Amble (Northumberland). — U.D.C. Electrical installations in 14 houses and two bungalows.—N. Young (Amble).

Bournemouth.—Highways and Works Committee. Recommended. 362 lighting units for main road lighting (£14,400).—G.E.C.

Carlisle.—City Council. Electrical installations in houses.—G. Bowman, Ltd. (142 houses); Electricity Board (61 houses).

Chorley (Lancs.).—R.D.C. Trunk road A.S9 street lighting installation.—Cohen Bros. (Electrical) Ltd.

London.—SOUTHWARK.—Borough Council. Recommended. Signs, posts, lighting fittings, etc., for signposting for the "through route" system (£1,124).—Franco Traffic Signs.

WORK IN PROSPECT

Particulars of new works and building schemes for the use of electrical installation contractors and traders. Publication in this section is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Birmingham.—Teachers' training college, Westbourne Road, Edgbaston (£374,899); E. L. Russell, chief education officer, Education Office, Margaret Street, 3.

Cambridge.—Courts (£300,000); county architect, Shire Hall, Castle Hill.

Canterbury.—Offices, Broad Street; John L. Denman & Son, architects, 27, Queen's Road, Brighton.

Denbigh.—Nurses' home at Denbighshire Infirmary (£38,748); Welsh Regional Hospital Board, Temple of Peace & Health, Cardiff.

Exeter.—Conversions at Matford House, Alphington, to form hotel (£35,000); W. Adkins, Tudor Cottage, Bath Road, Taplow, Burnham, Bucks.

Farnborough.—First section of scheme for technical college (£133,387); county architect, The Castle, Winchester.

Gosport.—Reconstruction of Thorngate Hall; borough engineer, Town Hall.

Court house, police station and offices (£31,500); Hants county architect, The Castle, Winchester.

Grantham.—Additions to Kesteven and Grantham Girls' School (£55,000); county architect, County Offices, Sleaford, Lincs.

Hampton Hill.—Offices and factory extensions, for Grundy (Teddington), Ltd., sheet metal workers and engineers, of Somerset Works, Somerset Road, Teddington.

Hemel Hempstead.—Factory; David Allan (Dallan Products), Ltd., 119, Haggerston Road, London, E.2.

Ince-in-Makerfield. — Paint factory at Kirkless; Arc Welding & Engineering Co., Ltd., St. Helens Road, Bolton.

London.—Factory in Chase Road, N.14; C. E. Owen Ward, architect, 1a, Aldermans Hill, Palmers Green, N.13.

CAMBERWELL.—Shops and offices, Camberwell Road; D. E. Harrington, architect, 24, Buckingham Street, W.C.2.

CITY.—Office block, Ropemaker Street; Joseph Mendleson, architect, 15, Hanover Square, W.1.

ISLINGTON.—Rebuilding portion of premises in Holloway Road; Jelks of Holloway, house furnishers and removal contractors, 263, Holloway Road, N.7.

ST. PANCRAS.—Showrooms and offices, Whitfield Street; Dearsley & Carter, Ltd., 91, King Street, W.6.

Maidstone.—Works, offices and showrooms in King Street; Miles (Maidstone), Ltd., motor engineers, 62, King Street.

Middlesbrough.—Rebuilding large stores destroyed by fire for Binns, Ltd., Sunderland.

Seamen's hostel, Marton Road, for Merchant Navy Welfare Board (£40,000); N. Thompson, Ltd., builders, Stonehouse Street.

Mitcham.—Distribution warehouse in Morden Road; Brooks & Warburton, Ltd., 232, Vauxhall Bridge Road, London, S.W.1.

Newcastle-on-Tyne.—Proposed new factory for Thomas Hedley & Co., detergent manufacturers, City Road, Newcastle.

North Wembley.—Factory extensions; Wrigley Products, Ltd., East Lane.

Poole.—Block of offices, workshop, canteen, etc., Waterloo Road; S. Arthur Walford, architect, Austin Avenue, Parkstone.

Radcliffe.—Factory and offices at Allens Green; Sweetule Products, Ltd., manufacturing chemists, 35, Church Street.

Stafford.—Multi-storey flats, Manor estate; borough engineer.

Stockport.—Extensions to factory for Kay Bros., Ltd.; Pierce & Son, architects, St. Petersgate, Stockport.

Stoke-on-Trent.—Central engineering establishment for National Coal Board, Hobart House, London, S.W.1.

Whitley Bay.—Ice rink for Durham Ice & Sports Stadium, Ltd.; C. Solomon, architect, 30, St. Mary's Place, Newcastle-on-Tyne.

Wigan.—Factory at Kitt Green; H. J. Heinz & Co., Ltd., food products, Harlesden, London, N.W.10.

Windsor.—First stage of East Berks College of Further Education; W. E. Chivers & Sons, Ltd., builders, Estcourt Street, Devizes.

Yeovil.—Erection of phase 1 of Municipal College; R. O. Harris, county architect, Park Street, Taunton.

* Specifications may be inspected at the Export Services Branch, Board of Trade, Lacon House, Theobald's Road, London, W.C.1 (Chancery 4411; extension 769).